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## MEDICAL SURVEILLANCE MONTHLY REPORT

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## Cold Weather-related Injuries, U.S. Armed Forces, July 2004-June 2009

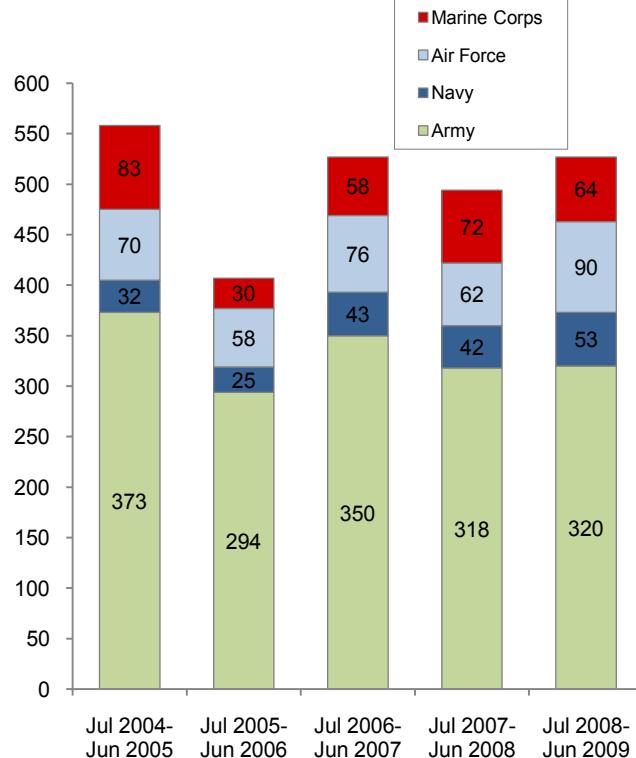
Prolonged and/or intense exposures to cold can significantly impact the health, well-being and operational effectiveness of service members and their units.<sup>1-4</sup> Because U.S. military operations are conducted in diverse geographic and weather conditions, the U.S. military has developed extensive countermeasures against threats associated with training and operating in cold environments.<sup>1-5</sup>

In recent years, rates of hospitalization for cold weather-related injuries of U.S. military members have generally declined — at least in part, because of improvements in clothing, equipment, policies, and practices.<sup>2</sup> Still, cold injuries (many of them preventable) affect hundreds of service members each year. This report summarizes frequencies, rates, and correlates of risk of cold injuries among members of active and reserve components of the U.S. Armed Forces during the past five years.

### Methods:

The surveillance period was 1 July 2004 to 30 June 2009. The surveillance population included all individuals who served in an active and/or reserve component of the U.S. Armed Forces any time during the surveillance period. For analysis purposes, years were divided into 1 July through 30

**Figure 1.** Cold injuries among members of active and reserve components, U.S. Armed Forces, by Service and year, July 2004-June 2009



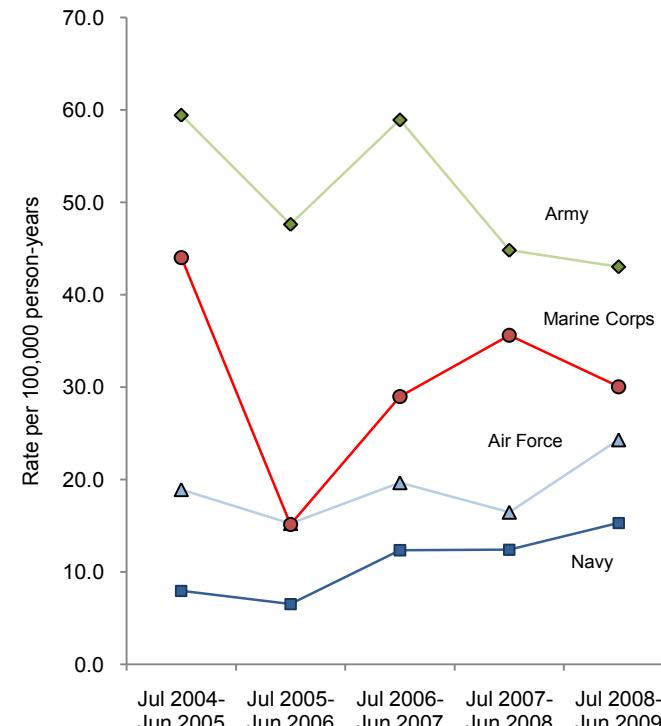
June intervals so that complete “cold weather seasons” could be represented in year-to-year summaries.

Inpatient, outpatient, and reportable medical event records in the Defense Medical Surveillance System (DMSS) were searched to identify all primary (first-listed) diagnoses of “frostbite” (ICD-9-CM codes: 991.0-991.3), “immersion foot” (ICD-9-CM: 991.4), “hypothermia” (ICD-9-CM: 991.6), and “other specified/unspecified effects of reduced temperature” (ICD-9-CM: 991.8-991.9). To exclude follow-up encounters for single cold injury episodes, only one cold injury per individual per year was included. In summaries by type of cold injury, one of each type of cold injury per individual per year was included. If multiple medical encounters for cold injuries occurred on the same day, only one was used for analysis (hospitalizations were prioritized over ambulatory visits).

### Results:

From July 2008 through June 2009, 527 members of the U.S. Armed Forces had at least one medical encounter with a primary diagnosis of cold injury — approximately one-fifth (n=105) of all cases affected members of the Reserve component. During the past cold season, the numbers of

**Figure 2.** Rates of “any cold injury”<sup>a</sup> among members of active components, by Service and year, July 2004-June 2009



<sup>a</sup>One cold injury per individual per year

cold injuries affecting members of the Navy (n=53) and Air Force (n=90) were higher than in any of the previous four cold seasons (**Figure 1**).

During the 2008-9 season, among active component members, the overall rate of a cold injury of any type (30.3 per 100,000 person years [p-yrs]) was not exceptional compared to the annual rates of the previous four years. Among the Services, the rate of any cold injury in the Army (43.0 per 100,000 p-yrs) was approximately 40% higher than in the Marine Corps (30.1 per 100,000 p-yrs), 75% higher than in the Air Force (24.3 per 100,000 p-yrs), and nearly 3-times higher than in the Navy (15.3 per 100,000 p-yrs) (**Figure 2**). During the year, soldiers accounted for more than one-half (55.2%) of all active component service members affected by cold injuries.

During the past cold season, frostbite was the most frequently reported cold injury in all services except the Marine Corps. In the Army, rates of cold injuries overall — and immersion foot and unspecified cold injuries, specifically — were lower in 2008-9 than any other year of the period (**Table 1a**). In the Navy, rates of frostbite and immersion foot were higher in 2008-9 than any of the previous four seasons. In the Air Force in the past cold season, rates of cold injuries overall - and especially rates of immersion foot and unspecified cold injury - were relatively high. In the Marine

Corps, the overall cold injury rate in 2008-9 was lower than the average of the overall rates during the previous four years (**Tables 1b-d**).

During the past five years, in the Army and Marine Corps, rates of frostbite, unspecified cold injury, and cold injuries overall were sharply higher among females than males (**Tables 1a,d**). In the Air Force and Navy, there were no clear relationships between gender and cold injury risk (**Tables 1b-c**).

In the Army, Air Force, and Marine Corps, rates of cold injuries overall — and frostbite, in particular — were sharply higher among Black non-Hispanic than other racial-ethnic group members. In the Navy, there were no clear relationships between race-ethnicity and cold injury risk (**Tables 1a-d**).

In general, rates of cold injuries were higher among the youngest aged (<20 years old) and enlisted members relative to their respective counterparts. However, in the Navy and Air Force, rates of hypothermia were higher among 20-24 years olds than those younger or older; and in the Marine Corps, rates of frostbite were more than 4-times higher among officers than enlisted members (**Tables 1a-d**).

During the last five cold seasons, there were 2,075 incident annual episodes of cold injury of any type (based on one episode per person per year) among active service members;

**Table 1a.** Cold injuries, active component, U.S. Army, July 2004-June 2009

	Frostbite		Immersion foot		Hypothermia		Unspecified		All cold injuries <sup>b</sup>	
	No.	Rate <sup>a</sup>	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Total	679	26.7	170	6.7	113	4.5	389	15.3	1,351	53.2
<b>Sex</b>										
Male	502	23.0	148	6.8	102	4.7	225	10.3	977	44.7
Female	177	50.0	22	6.2	11	3.1	164	46.4	374	105.7
<b>Race/ethnicity</b>										
White, non-Hisp	284	18.2	114	7.3	75	4.8	153	9.8	626	40.2
Black, non-Hisp	296	56.2	36	6.8	27	5.1	174	33.0	533	101.1
Other	99	21.8	20	4.4	11	2.4	62	13.6	192	42.2
<b>Age</b>										
<20	81	47.9	24	14.2	23	13.6	54	31.9	182	107.6
20-24	269	32.2	80	9.6	53	6.4	148	17.7	550	65.9
25-29	136	23.4	34	5.9	17	2.9	78	13.4	265	45.6
30-34	89	23.6	16	4.2	9	2.4	52	13.8	166	44.0
35-39	61	19.2	14	4.4	5	1.6	38	12.0	118	37.2
40-44	23	13.2	1	0.6	4	2.3	10	5.7	38	21.8
45+	20	23.4	1	1.2	2	2.3	9	10.5	32	37.4
<b>Rank</b>										
Enlisted	630	29.7	144	6.8	105	5.0	355	16.7	1,234	58.2
Officer	49	11.7	26	6.2	8	1.9	34	8.1	117	28.0
<b>Cold year (Jul-Jun)</b>										
2004-2005	168	34.3	43	8.8	20	4.1	84	17.2	315	64.3
2005-2006	110	22.7	39	8.0	15	3.1	72	14.8	236	48.6
2006-2007	154	30.7	37	7.4	28	5.6	93	18.5	312	62.1
2007-2008	122	23.5	26	5.0	25	4.8	72	13.8	245	47.1
2008-2009	125	23.1	25	4.6	25	4.6	68	12.6	243	44.9

<sup>a</sup>Rate per 100,000 persons-years

<sup>b</sup>One of each type of cold injury per individual per year

<sup>a</sup>Rate per 100,000 persons-years

<sup>b</sup>One of each type of cold injury per individual per year

**Table 1b.** Cold injuries, active component, U.S. Navy, July 2004-June 2009

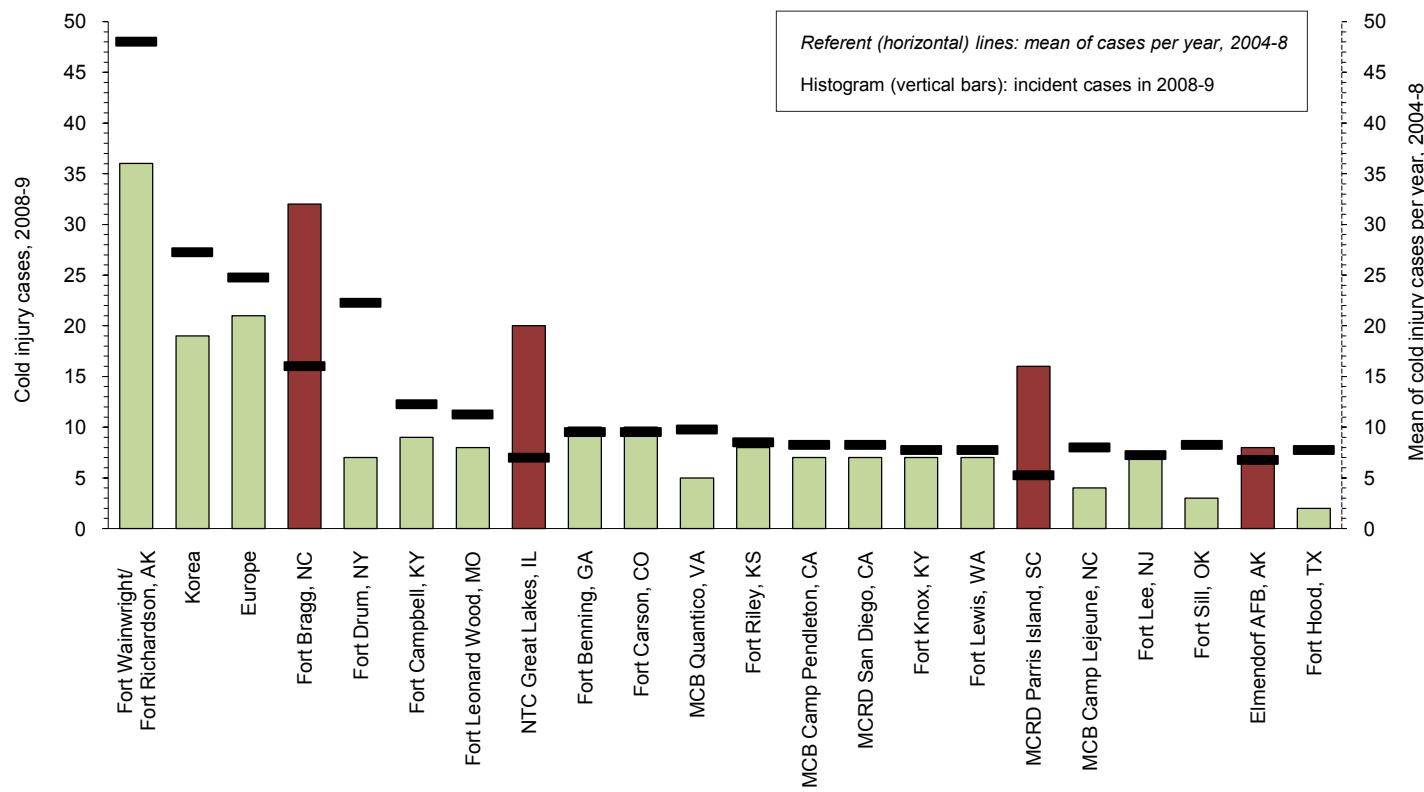
	Frostbite		Immersion foot		Hypothermia		Unspecified		All cold injuries <sup>b</sup>	
	No.	Rate <sup>a</sup>	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Total	70	4.1	38	2.2	51	3.0	29	1.7	188	11.0
<b>Sex</b>										
Male	59	4.0	35	2.4	45	3.1	22	1.5	161	11.0
Female	11	4.4	3	1.2	6	2.4	7	2.8	27	10.8
<b>Race/ethnicity</b>										
White, non-Hisp	33	3.4	25	2.6	30	3.1	17	1.8	105	10.9
Black, non-Hisp	17	5.6	2	0.7	7	2.3	4	1.3	30	9.9
Other	20	4.5	11	2.5	14	3.1	8	1.8	53	11.9
<b>Age</b>										
<20	16	14.5	15	13.6	4	3.6	5	4.5	40	36.3
20-24	27	4.8	12	2.1	25	4.5	11	2.0	75	13.4
25-29	10	2.6	5	1.3	12	3.1	7	1.8	34	8.9
30-34	5	2.0	3	1.2	7	2.8	4	1.6	19	7.5
35-39	5	2.2	2	0.9	1	0.4	1	0.4	9	4.0
40-44	3	2.5	1	0.8	1	0.8	0	0.0	5	4.1
45+	4	6.2	0	0.0	1	1.6	1	1.6	6	9.3
<b>Rank</b>										
Enlisted	63	4.3	34	2.3	45	3.1	25	1.7	167	11.5
Officer	7	2.7	4	1.5	6	2.3	4	1.5	21	8.0
<b>Cold year (Jul-Jun)</b>										
2004-2005	6	1.6	3	0.8	16	4.4	4	1.1	29	8.0
2005-2006	4	1.1	5	1.4	8	2.3	7	2.0	24	6.8
2006-2007	15	4.4	7	2.1	17	5.0	4	1.2	43	12.6
2007-2008	20	6.1	9	2.7	3	0.9	9	2.7	41	12.4
2008-2009	25	7.6	14	4.3	7	2.1	5	1.5	51	15.6

**Table 1c.** Cold injuries, active component, U.S. Air Force, July 2004-June 2009

	Frostbite		Immersion foot		Hypothermia		Unspecified		All cold injuries <sup>b</sup>	
	No.	Rate <sup>a</sup>	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Total	174	10.2	46	2.7	46	2.7	66	3.9	332	19.5
Sex										
Male	143	10.4	40	2.9	39	2.8	46	3.4	268	19.5
Female	31	9.3	6	1.8	7	2.1	20	6.0	64	19.1
Race/ethnicity										
White, non-Hisp	114	9.5	36	3.0	32	2.7	35	2.9	217	18.0
Black, non-Hisp	37	15.0	7	2.8	11	4.5	24	9.7	79	32.0
Other	23	9.1	3	1.2	3	1.2	7	2.8	36	14.2
Age										
<20	21	25.9	7	8.6	3	3.7	10	12.4	41	50.7
20-24	81	16.3	19	3.8	29	5.8	29	5.8	158	31.7
25-29	28	7.0	8	2.0	5	1.3	16	4.0	57	14.3
30-34	18	6.9	5	1.9	3	1.2	6	2.3	32	12.3
35-39	13	5.4	7	2.9	3	1.3	1	0.4	24	10.0
40-44	10	6.2	0	0.0	1	0.6	4	2.5	15	9.3
45+	3	4.5	0	0.0	2	3.0	0	0.0	5	7.5
Rank										
Enlisted	152	11.2	44	3.2	43	3.2	59	4.3	298	21.9
Officer	22	6.4	2	0.6	3	0.9	7	2.0	34	9.8
Cold year (Jul-Jun)										
2004-2005	46	12.6	8	2.2	6	1.6	11	3.0	71	19.5
2005-2006	19	5.5	9	2.6	12	3.5	16	4.6	56	16.1
2006-2007	43	12.6	7	2.1	10	2.9	10	2.9	70	20.6
2007-2008	33	10.1	6	1.8	6	1.8	10	3.1	55	16.8
2008-2009	33	10.2	16	4.9	12	3.7	19	5.8	80	24.6

<sup>a</sup>Rate per 100,000 persons-years<sup>b</sup>One of each type of cold injury per individual per year**Table 1d.** Cold injuries, active component, U.S. Marine Corps, July 2004-June 2009

	Frostbite		Immersion foot		Hypothermia		Unspecified		All cold injuries <sup>b</sup>	
	No.	Rate <sup>a</sup>	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Total	83	9.0	84	9.1	81	8.8	41	4.4	289	31.3
Sex										
Male	72	8.3	79	9.1	77	8.9	37	4.3	265	30.6
Female	11	19.3	5	8.8	4	7.0	4	7.0	24	42.1
Race/ethnicity										
White, non-Hisp	52	8.5	58	9.4	48	7.8	21	3.4	179	29.1
Black, non-Hisp	14	14.4	10	10.3	10	10.3	8	8.2	42	43.1
Other	17	8.1	16	7.6	23	10.9	12	5.7	68	32.3
Age										
<20	22	16.9	40	30.8	36	27.7	11	8.5	109	83.8
20-24	38	8.6	36	8.2	36	8.2	26	5.9	136	30.8
25-29	10	6.1	7	4.3	6	3.7	3	1.8	26	15.9
30-34	9	10.4	1	1.2	2	2.3	1	1.2	13	15.1
35-39	3	4.9	0	0.0	0	0.0	0	0.0	3	4.9
40-44	0	0.0	0	0.0	1	3.5	0	0.0	1	3.5
45+	1	8.2	0	0.0	0	0.0	0	0.0	1	8.2
Rank										
Enlisted	55	6.7	84	10.2	76	9.2	36	4.4	251	30.4
Officer	28	28.9	0	0.0	5	5.2	5	5.2	38	39.2
Cold year (Jul-Jun)										
2004-2005	15	8.5	20	11.3	25	14.1	19	10.7	79	44.6
2005-2006	7	3.9	9	5.0	11	6.2	1	0.6	28	15.7
2006-2007	26	14.5	16	8.9	5	2.8	5	2.8	52	29.0
2007-2008	17	9.0	21	11.2	21	11.2	10	5.3	69	36.7
2008-2009	18	9.0	18	9.0	19	9.5	6	3.0	61	30.6

<sup>a</sup>Rate per 100,000 persons-years<sup>b</sup>One of each type of cold injury per individual per year**Figure 3.** Annual number of cold injuries, 2008-9 and mean during 2004-8, at locations with at least 30 cold injuries during the surveillance period, active component members, U.S. Armed Forces, July 2004-June 2009

**Table 2.** Installations (with at least 30 total cases) with the highest numbers of any cold injury, active component, U.S. Armed Forces, July 2004-June 2009

Assigned location	2004-2005		2005-2006		2006-2007		2007-2008		2008-2009		Total	
	No.	Rate*	No.	Rate*								
Fort Wainwright/ Fort Richardson, AK	33	423.3	43	443.1	69	592.0	47	404.2	36	292.0	228	429.3
Korea	23	62.5	29	97.5	37	135.9	20	79.6	19	79.3	128	89.6
Europe	34	46.5	20	31.3	16	25.9	29	52.6	21	41.6	120	39.4
Fort Bragg, NC	16	37.5	21	49.8	11	25.2	16	33.9	32	66.4	96	42.9
Fort Drum, NY	49	349.2	14	87.5	14	82.5	12	69.6	7	38.3	96	116.3
Fort Campbell, KY	17	61.6	4	13.5	19	64.3	9	29.0	9	27.5	58	38.5
Fort Leonard Wood, MO	17	173.5	4	37.1	11	95.4	13	105.8	8	58.7	53	91.3
NTC Great Lakes, IL	2	12.3	3	19.3	8	50.6	15	93.9	20	117.2	48	59.5
Fort Benning, GA	16	82.7	8	40.2	6	30.7	8	40.2	10	46.3	48	47.8
Fort Carson, CO	2	11.9	6	34.9	14	91.4	16	91.5	10	51.5	48	55.7
MCB Quantico, VA	5	71.1	5	73.1	12	173.4	17	222.8	5	62.4	44	120.8
Fort Riley, KS	11	105.3	4	37.2	11	84.7	8	51.5	8	50.8	42	64.2
MCB Camp Pendleton, CA	17	46.5	3	7.9	3	7.8	10	24.8	7	19.6	40	21.2
MCRD San Diego, CA	6	114.8	6	114.3	13	239.6	8	134.2	7	118.5	40	144.1
Fort Knox, KY	7	88.2	8	100.4	6	73.2	10	124.6	7	85.3	38	94.2
Fort Lewis, WA	8	37.6	5	20.3	13	55.3	5	17.8	7	23.0	38	29.7
MCRD Parris Island, SC	10	176.1	6	110.3	4	72.0	1	15.4	16	251.7	37	125.3
MCB Camp Lejeune, NC	13	38.9	2	5.7	6	16.6	11	28.4	4	12.0	36	20.4
Fort Lee, NJ	11	218.2	5	88.7	5	79.1	8	125.6	7	102.4	36	119.2
Fort Sill, OK	10	84.7	6	52.4	13	96.9	4	33.0	3	25.4	36	59.4
Elmendorf AFB, AK	12	177.9	5	76.8	9	142.7	1	17.3	8	138.6	35	112.5
Fort Hood, TX	3	6.8	8	17.8	10	19.4	10	18.4	2	3.6	33	13.2

\*Rate per 100,000 person-years

of these, 170 (8.2%) affected recruits/basic trainees. Marine Corps recruits accounted for relatively more of the total cold injuries of their service (28.9% of all cold injuries during the period) than did recruits of the other services (Army, 5.8%; Navy, 4.3%; Air Force, 1.9%) (data not shown).

During the five-year period, 38 of the 2,075 incident annual episodes of cold injury required hospital treatment. Most of the hospitalized cold injury cases were among Army (n=27) and Marine Corps (n=7) members (data not shown).

During the surveillance period, 30 or more cold injuries occurred at each of 22 locations worldwide. Of these locations, only four had more (and 15 had fewer) cold injuries in 2008-9 than the average annual episodes at the respective locations during the prior four years (Figure 3). Of locations/U.S. military installations in the past year, Forts Wainwright and Richardson in Alaska (n=36), Fort Bragg, NC (n=32), Europe (n=21), Naval Training Center Great Lakes, IL (n=20) and Korea (n=19) had the largest numbers of cold injuries among active component members (Figure 3).

#### Editorial comment:

In general, during the past cold season, numbers, rates, and types of cold injuries among U.S. service members were

similar to those in recent years. As in the past, rates of cold injuries overall remain higher in the Army and Marine Corps than in the Air Force and Navy. However, during the past cold season, the rate of cold injuries overall was lower in the Army, and higher in the Air Force and Navy, than in any of the prior four cold seasons in the respective services.

Comparisons of the cold injury experiences of the Services should be done carefully if at all. For example, differences across services in cold injury rates — overall, by type, and in relation to the military characteristics of those most affected — reflect differences in the natures, locations, and circumstances of the training and operations of the Services. Also, differences in rates across services may reflect differences in the ascertainment and/or reporting of cold injury cases (e.g., records of medical encounters during field exercises, deployment operations, and aboard Navy ships are not routinely available for health surveillance purposes).

In general, among service members overall, the youngest aged, female, enlisted, and Black non-Hispanic service members have relatively high rates of cold injuries — particularly frostbite. Other reports have documented that African American soldiers and soldiers with prior cold injuries have increased susceptibilities to cold injuries during prolonged or intense cold exposures.<sup>2,3</sup> Special vigilance by

individuals, line supervisors, commanders, and medical staffs is indicated to prevent cold injuries among those with known or suspected increased susceptibilities.

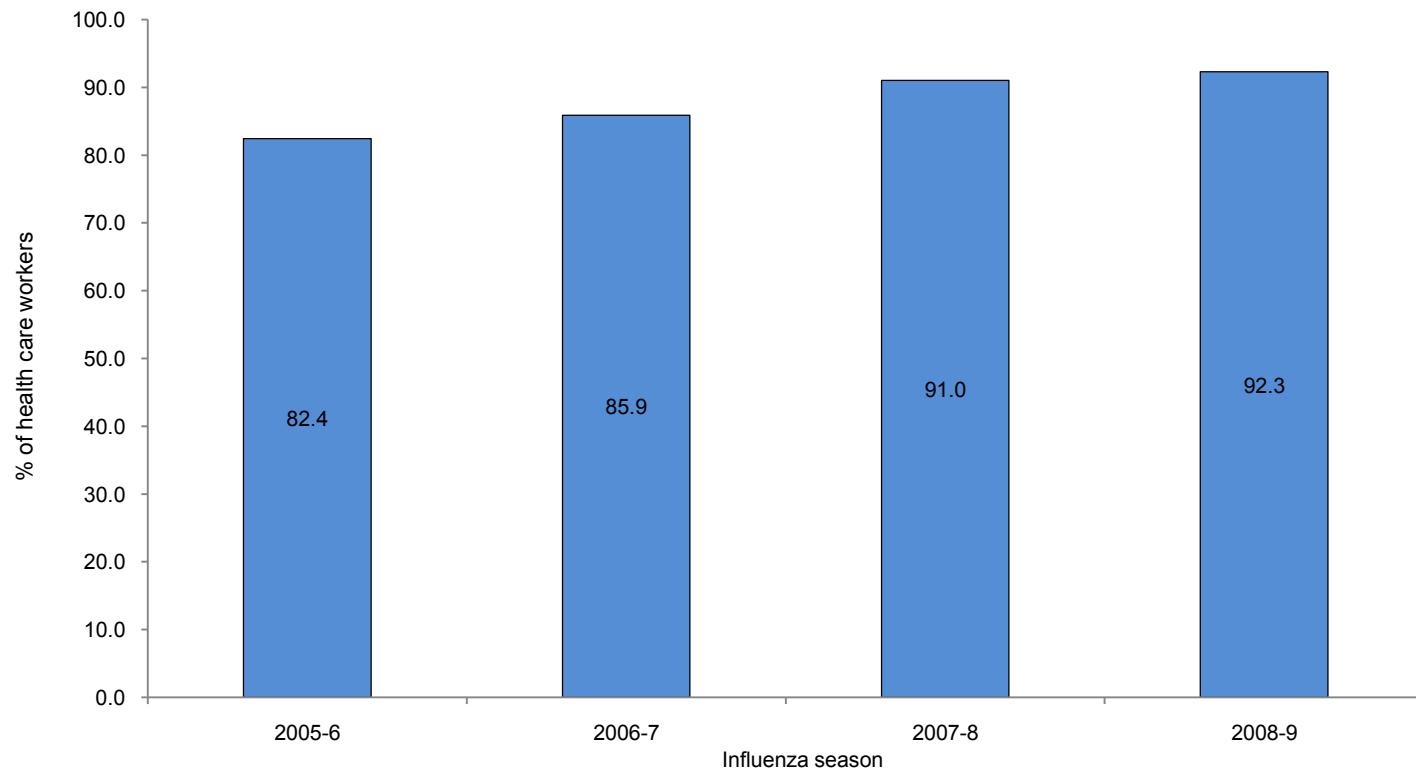
Commanders and supervisors at all levels should implement appropriate countermeasures to prevent cold injuries, including proper clothing and equipment, wind chill temperature monitoring and awareness training.<sup>1,4</sup> Service members who train in wet and freezing conditions should know the signs of cold injury, obtain adequate hydration, and avoid tobacco, caffeine and vasoconstrictive medications.<sup>1,4,5</sup> Up-to-date cold injury prevention materials (including posters, presentation outlines, policies, regulations, and technical bulletins) are available online: <http://chppm-www.apgea.army.mil/coldinjury>.

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## SURVEILLANCE SNAPSHOT: Influenza immunizations among health care workers

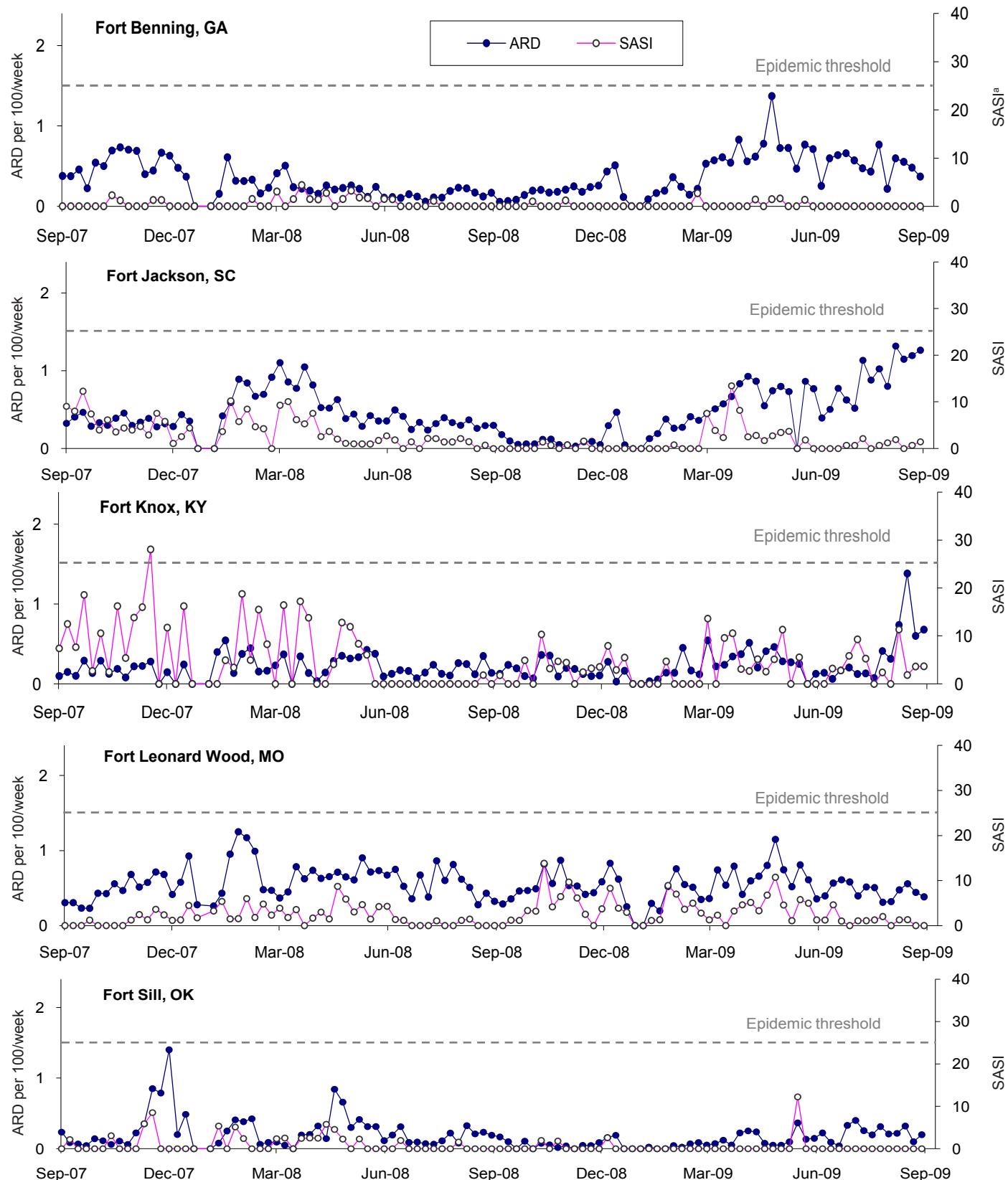
Percent of health care workers<sup>a</sup> who received an influenza immunization, by "influenza season" (August-April), active component, U.S. Armed Forces, August 2005-April 2009



Approximately 104,000 health care workers<sup>a</sup> serve in an active component of the United States military each year. During the past "influenza season" (August 2008-April 2009), at least 92.3% of health care workers received an influenza immunization, while the remainder (n=7,958) have no record of influenza immunization. Fewer than one percent of service members (n=245, 0.2%) had a record of a medical or administrative immunization exception during the past influenza season.

<sup>a</sup>Includes service members in all health care occupations except veterinary, environmental health, biomedical equipment maintenance and medical/health services administration.  
Source: Defense Medical Surveillance System

Acute respiratory disease (ARD) and streptococcal pharyngitis rates (SASI<sup>a</sup>),  
basic combat training centers, U.S. Army, by week, September 2007-September 2009



<sup>a</sup>Streptococcal-ARD surveillance index (SASI) = ARD rate x % positive culture for group A streptococcus  
ARD rate = cases per 100 trainees per week

ARD rate  $\geq 1.5$  or SASI  $\geq 25.0$  for 2 consecutive weeks are surveillance indicators of epidemics

## Preliminary report: Outbreak of Novel H1N1 Influenza aboard USS Boxer, 29 June - 31 July 2009

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**O**n 17 July 2009, the Commander, U.S. Third Fleet requested an investigation of a novel H1N1 influenza outbreak aboard USS Boxer. On 23 July, a 10-person investigation team boarded USS Boxer. The team was composed of military and civilian public health professionals from Navy Environmental & Preventive Medicine Unit 5, the Navy Marine Corps Public Health Center, Pacific Command (PACOM), the Armed Forces Health Surveillance Center (AFHSC), and the Uniformed Services University of the Health Sciences.

The investigation focused on risk factors for novel H1N1 influenza, the extent of viral transmission, the severity of illness and the effectiveness of isolation, quarantine, and antiviral treatment. To this end, the team conducted interviews with medical department staff; reviewed ward notes, charts and pharmacy records; mapped affected individuals' berthing and work assignments; and collected nasopharyngeal and oropharyngeal swabs and blood serum samples. Questionnaires were completed by more than 400 symptomatic and asymptomatic participants. Pending laboratory analyses of nasopharyngeal/oropharyngeal swab and serum samples by the Naval Health Research Center (NHRC), the final report is expected to provide insights into the clinical epidemiology of novel H1N1 influenza among active military members, including, for example, the viral shedding period, the ratio of symptomatic-to-asymptomatic clinical expressions of infection, and the effectiveness of isolation and antiviral treatment.

The following timeline summarizes initial findings from the investigation with respect to the dynamics of the outbreak.

**29 June:** USS Boxer with more than 2,200 sailors and Marines aboard departed Phuket, Thailand, after a 5-day liberty port. Of 30 patients treated in sick call, most had upper respiratory symptoms.

**30 June:** Fourteen patients with acute febrile respiratory illnesses (FRI) were tested by PCR; four were positive for influenza A virus. Isolation procedures were initiated to counter the spread of influenza throughout the ship. All individuals who presented to sick call with fever (oral temperature  $\geq 100.0^{\circ}\text{F}$ ) and at least one acute respiratory illness-associated symptom (e.g., cough, sore throat, rhinorrhea) were masked and confined to the medical unit. Patients were released from isolation when afebrile (normal temperature for 24 hours without medication) if they had no productive cough.

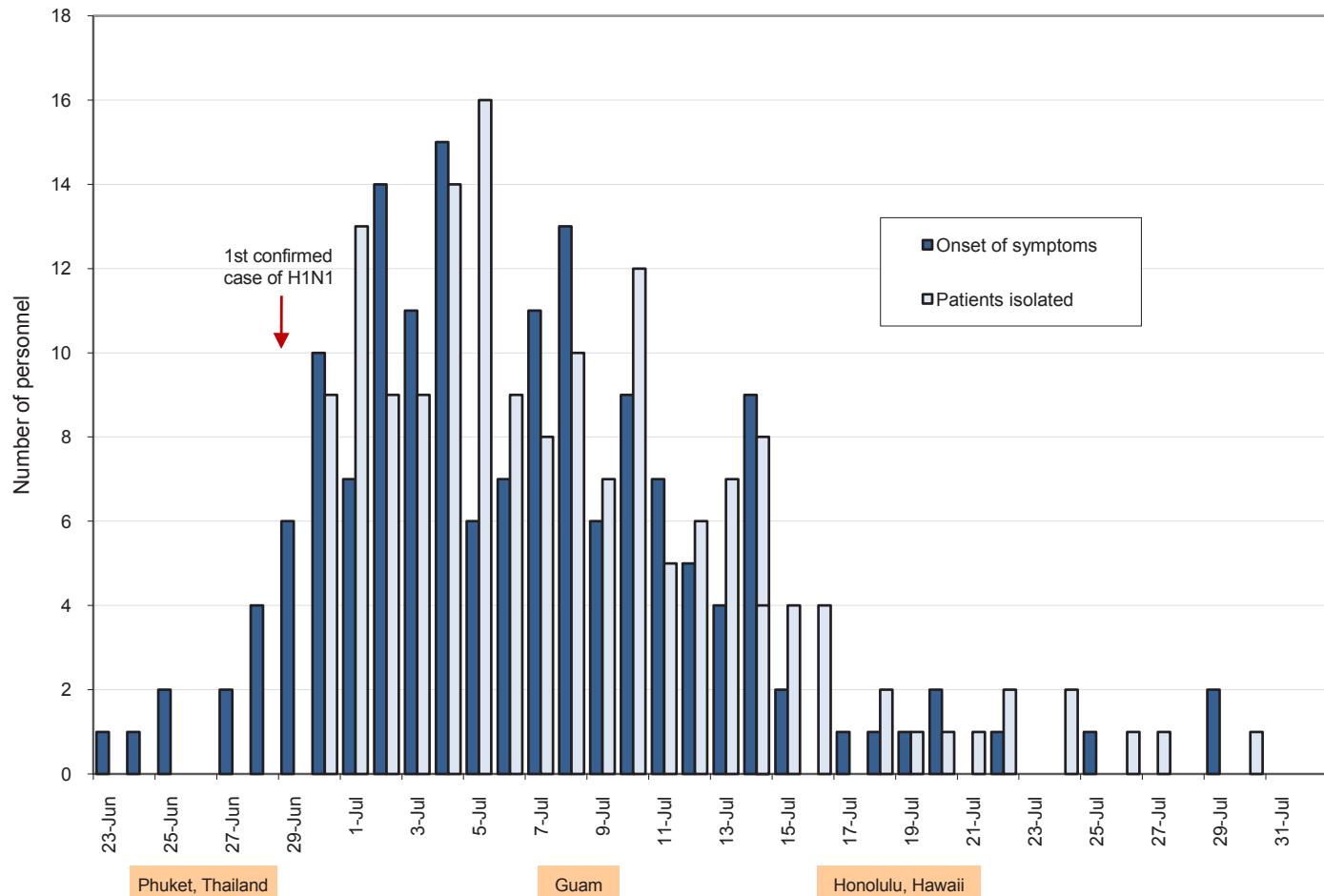
**9 July:** Oropharyngeal swabs (n=102) that had been taken from patients with influenza-like illnesses (ILI) since 29 June were shipped to NHRC for respiratory pathogen (including novel H1N1 influenza) surveillance purposes. Prior to 9 July, only 4 patients had been treated with the antiviral medication TAMIFLU® due to limited quantities on board. When the ship was resupplied in Guam, 37 additional patients were treated with TAMIFLU®.

**14 July:** NHRC reported that more than two-thirds (67.6%) of the 102 oropharyngeal swabs collected since 29 June were positive for novel H1N1 influenza.

**31 July:** Two patients remained in isolation. From 30 June through 30 July, approximately one of every 14 (n=166, 7.3%) personnel on board were isolated for acute febrile respiratory illnesses (Figure 1). At initial presentation, most patients reported cough (87%), headache (82%) body aches (80%), chills (74%) and sore throat (60%) and recalled contact with someone who was ill (51%). Clinical courses were generally mild and relatively brief. No patients required supplemental oxygen or mechanical ventilation. The mean oral temperature (maximum) during the illness was  $101.7^{\circ}\text{F}$ . The mean period of isolation was 3.6 days.

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**Figure 1.** Cases of febrile illness during a novel H1N1 influenza outbreak aboard USS Boxer (n=166 patients isolated), 23 June-31 July 2009



29 June: First clinical suspicion of an outbreak

30 June: Febrile illness clinically apparent. 4/14 PCR tests positive for influenza A. Isolation begins

9 July: 102 oropharyngeal swabs shipped for testing

14 July: 69 of 102 swabs found positive for H1N1

17 July: Commander, U.S. Third Fleet requests outbreak investigation

23 July: 10-person investigation team boards USS Boxer

31 July: 166 patients isolated since 30 June

## Mental Disorders after Deployment to OEF/OIF in relation to Predeployment Mental Health and During Deployment Combat Experiences, Active Components, U.S. Armed Forces, January 2006-December 2007

**A**mong U.S. military members, mental disorders are the leading cause of hospital bed days and the second leading cause of medical encounters.<sup>1</sup> In addition, mental disorders that are associated with participation in combat operations (e.g., post-traumatic stress disorder) degrade the health, fitness, operational effectiveness, and morale of affected service members and their units.<sup>2,3</sup> Since the beginning of combat operations in Iraq and Afghanistan, studies have documented the natures, high prevalences, and correlates of risk of mental disorders among U.S. combat veterans.<sup>2,3</sup> Policies and practices have been instituted to decrease barriers to care for affected service members.<sup>4</sup>

A recent report (MSMR, February 2009) documented strong associations between deployers' postdeployment mental health diagnoses and their predeployment mental health histories.<sup>5</sup> The results were in accord with the common surveillance finding that deployers who are hospitalized for illnesses or injuries prior (particularly shortly prior) to the time of deployment are more likely to be hospitalized during and after deployment—particularly for the same conditions.<sup>5-7</sup>

Research on deployment-related mental health problems has consistently highlighted combat exposure as an important predictor of depression and anxiety-related symptoms.<sup>2,3,8</sup> Combat exposure is assessed on postdeployment health assessments (DD2796); deployers are asked if they "engaged in direct combat where [they] discharged a weapon" or felt "in great danger of being killed."<sup>2</sup>

This report extends previous findings in several ways. In particular, the analysis measures the independent associations and interactions between predeployment mental health experience and post deployment morbidity using both clinical encounters and self-reported (screening) symptoms. Additionally, self-reported combat exposure is incorporated as an outcome of predeployment morbidity and as a predictor of postdeployment symptoms or diagnoses.<sup>2,3,8</sup>

### Methods:

The surveillance period was 1 January 2006 to 31 December 2007. The surveillance population included all active component service members who deployed in support of Operation Iraqi Freedom (OIF) or Operation Enduring Freedom (OEF) (where both the start and end dates of the relevant deployment were within the surveillance period) and filled out a post-deployment health assessment

(DD2796). If individuals had more than one OEF/OIF deployment during the period, only the earliest ("index deployment") was included for analysis. Start and end dates of deployment participation were ascertained from records routinely provided by the Defense Manpower Data Center to the Armed Forces Health Surveillance Center (AFHSC) for integration in the Defense Medical Surveillance System (DMSS).

For each deployer, all medical encounters from one year before to one year after the start and end dates, respectively, of the deployment were ascertained. Mental health encounters of interest included those with depression or anxiety-related diagnoses (in any diagnostic position) during a hospitalization or as a primary (first-listed) diagnosis during a mental health outpatient clinic encounter (indicated by the medical expense and performance reporting system [MEPRS] facility codes) (Table 1). Three or more encounters at a mental health outpatient clinic within the year prior to deployment were considered predeployment "mental health treatment."

In relation to responses to postdeployment health assessments (DD2796), a positive PTSD screen consisted of endorsement of at least 2 of the 4 PC-PTSD items; a positive depression screen required the endorsement of "all the time" to at least 1 of the 2 depression symptoms; and a positive combat exposure screen required the self-report of firing a weapon in combat or feeling in danger of being killed.

In subgroups of deployers with various predeployment mental health encounter histories and various combat

**Table 1.** International Classification of Diseases, 9th edition (ICD-9) codes for diagnosis of depression and anxiety-related disorders and medical expense and performance reporting system (MEPRS) facility codes indicating mental health outpatient clinic

#### Depression (ICD-9-CM)

296.20-296.39, 296.50-296.55, 296.90, 300.40-300.49, 311  
309.0 Adjustment reaction with depressed mood/grief reaction  
309.1 Prolonged depressive (adjustment) reaction

#### Anxiety disorders (ICD-9-CM)

300.00-300.09, 300.20-300.39  
308.0-308.9 Acute stress reaction  
309.81 Posttraumatic stress disorder  
309.24 Adjustment disorder with anxiety

#### Mental health clinic

MEPRS facility code BFA - BFZ

exposures during deployment, percentages (cumulative incidence rates) with various postdeployment clinical experiences were calculated. Cumulative incidence rate ratios (RR) with 95% confidence intervals (CI) were calculated to estimate the effects of various pre- and during-deployment experiences on rates of various postdeployment mental disorder-related outcomes.

### Results:

Of 341,663 active component members who deployed to and returned from OEF/OIF-related assignments during the two-year surveillance period, 208,876 (61%) had post-deployment health assessments available for analysis. In this cohort, 4,532 (2.2%) and 3,157 (1.5%) had clinical diagnoses of depression and anxiety, respectively, within the year prior to deployment. Approximately one of 20 (n=10,595, 5.1%) deployers had at least three encounters at a mental health clinic ("mental health treatment") within one year before deploying.

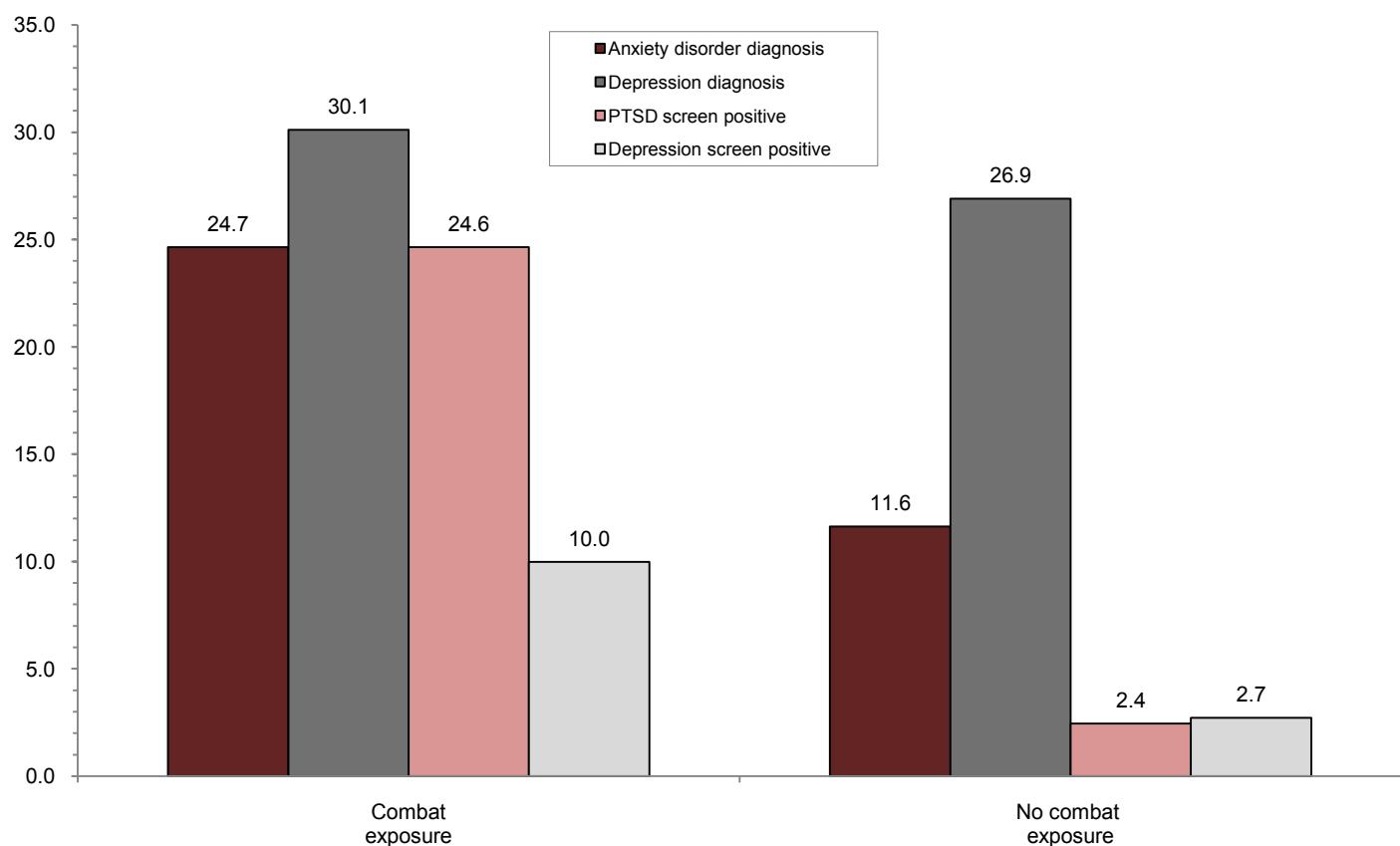
Within one year after returning from deployment, approximately one of 25 (n=8,873, 4.2%) deployers had a depression-related diagnosis and more than one of 20 (11,316, 5.4%) had an anxiety-related diagnosis. On postdeployment health assessments, nearly one of 10 (9.9%) and one of 20 (5.1%) returning deployers screened

positive for PTSD and depression, respectively. Compared to their counterparts, deployers who reported combat exposures were far more likely to screen positive for PTSD and depression on postdeployment health assessments and to have clinical encounters for depression and anxiety disorders (Figure 1).

Deployers with predeployment diagnoses of depression were 7.53 (95% CI 7.15-7.93) times more likely than their counterparts to receive depression diagnoses within one year after deployment. Deployers with predeployment diagnoses of anxiety disorder were 6.00 (95% CI 5.67-6.35) times more likely than other deployers to be diagnosed with anxiety disorder after deployment. "Mental health treatment" prior to deploying was associated with increased rates of both depression and anxiety disorder after deployment; however, mental health treatment before deployment was not as strong a predictor of postdeployment depression or anxiety disorder as were predeployment diagnoses of the respective disorders. Associations between predeployment histories of depression, anxiety, and mental health treatment and postdeployment diagnoses of depression and anxiety disorder were strongest soon (i.e., within 30 days) after redeployment (Figures 2a-c).

Deployers with histories of depression, anxiety disorder, or mental health treatment during the year before deploying were over twice as likely than their respective

**Figure 1.** Percentages of deployers with post-deployment diagnoses of depression and/or anxiety; or positive screening results for PTSD and/or depression, by self-reported combat exposure, active component, U.S. Armed Forces, January 2006-December 2007



counterparts to screen positive for depression and PTSD on postdeployment health assessments (Figures 3a-c). Mental disorder-related encounters prior to deployment were also associated with self-reported combat exposures. For example, deployers with predeployment anxiety disorder diagnoses were 1.19 (95% CI 1.14-1.25) times more likely than their counterparts to report feeling in danger of being killed (36.1% vs 30.3%) (Figure 3b).

Overall, combat exposure was associated with 1.8- and 3.2-times higher rates of postdeployment depression and anxiety disorder diagnoses, respectively. However, the strengths of associations between combat exposure

and postdeployment mental disorder diagnoses differed in relation to predeployment mental health experience; in particular, the effects of combat exposure were notably larger among those with no predeployment histories of depression, anxiety, or mental health treatment (Table 2).

#### Editorial comment:

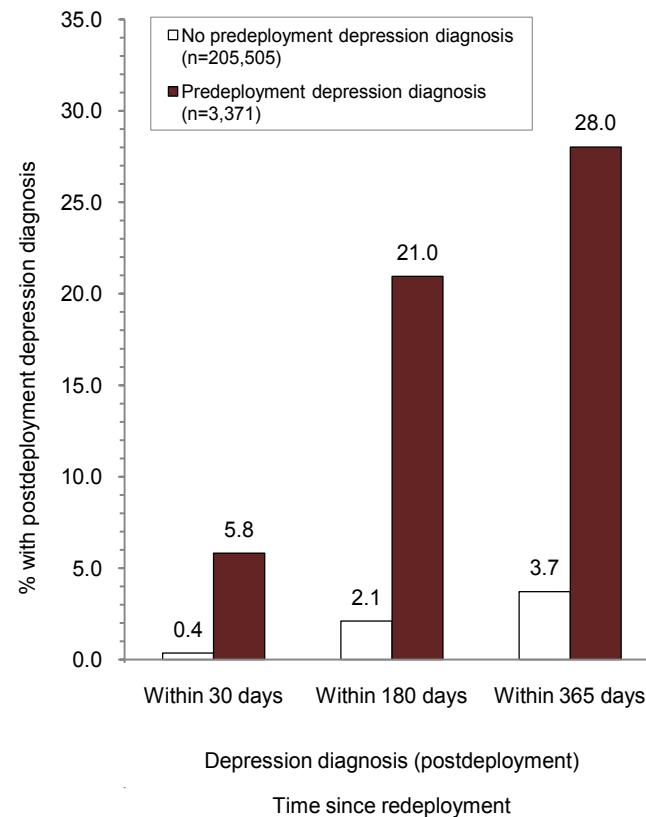
This analysis further demonstrates the association between predeployment and postdeployment mental disorder experiences of active component participants in combat operations overseas. The analysis extends findings of previous

**Table 2.** Effect of self-reported combat exposure<sup>a</sup> on postdeployment morbidity from anxiety (diagnosis and PTSD screen result) and depression (diagnosis and depression screen result), depending on presence of respective diagnosis before deployment, active component, U.S. Armed Forces, January 2006-December 2007

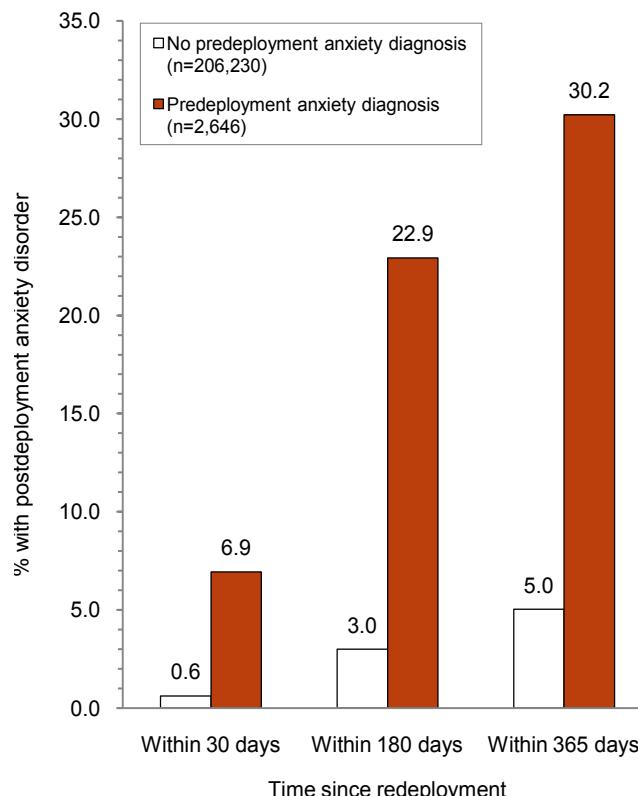
Strata of pre-deployment exposure	Predeployment depression diagnosis	Postdeployment outcomes			
		Depression diagnosis within 1 year of return from deployment	Depression screen positive	Anxiety disorder diagnosis within 1 year of return from deployment	PTSD screen positive
		No (n = 204,344)	1.88 (1.80-1.96)	3.71 (3.56-3.86)	
Predeployment anxiety disorder diagnosis	Yes (n = 4,532)		1.12 (1.02-1.23)	2.94 (2.53-3.42)	
	No (n = 205,719)				3.37 (3.24-3.50) 10.24 (9.87-10.62)
	Yes (n = 3,157)				1.49 (1.34-1.66) 5.84 (4.97-6.86)

<sup>a</sup>Rate ratios, with 95% confidence intervals, compare risk among combat-exposed vs. combat-unexposed.

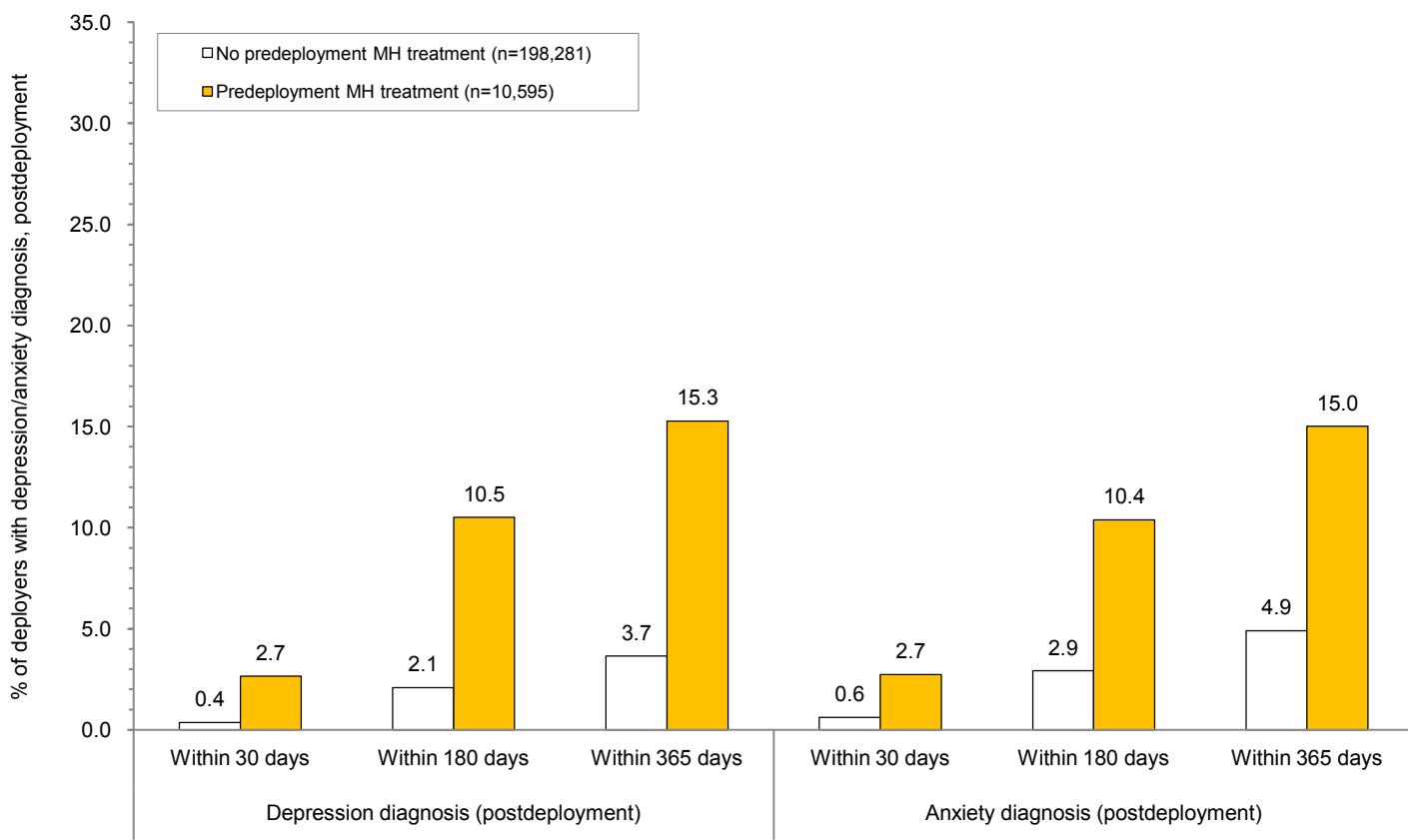
**Figure 2a.** Percentage of deployers with depression diagnosis, by time since return from deployment, by predeployment depression diagnosis, active component, U.S. Armed Forces, January 2006-December 2007



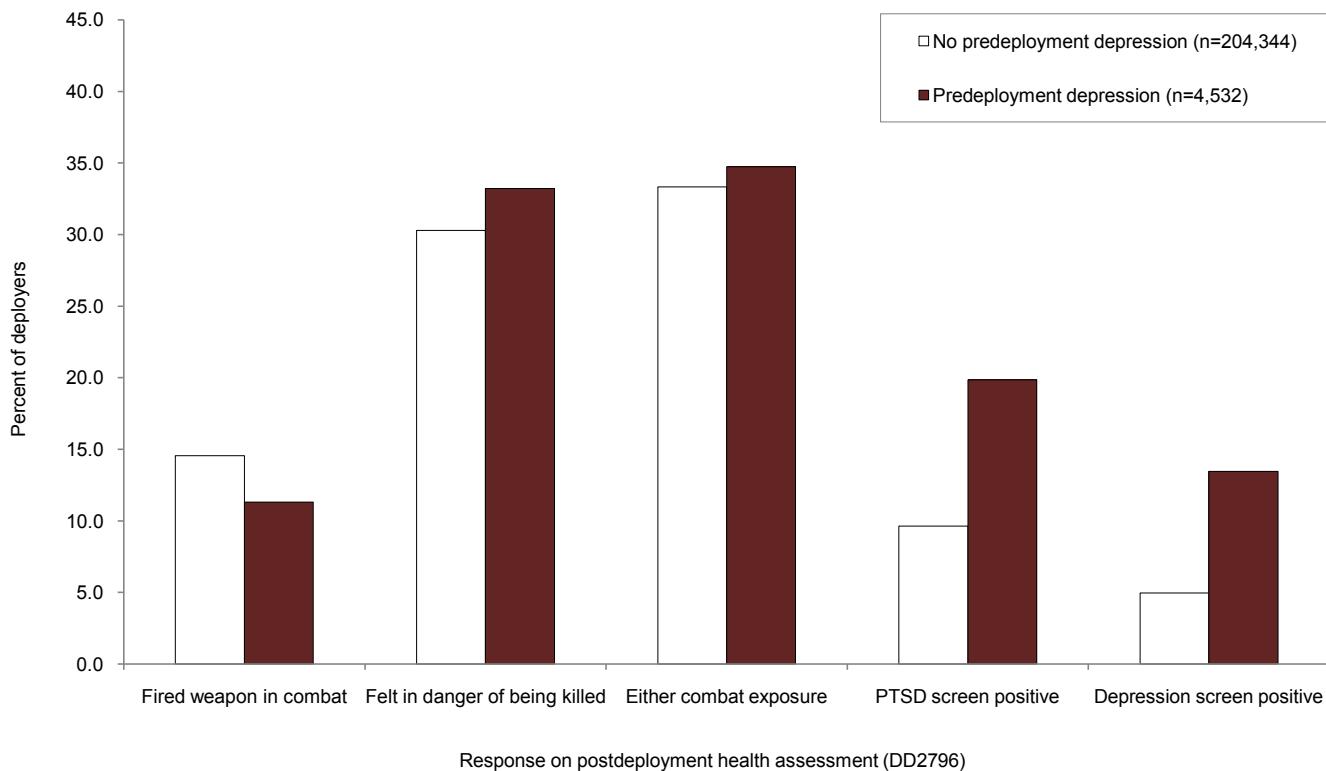
**Figure 2b.** Percentage of deployers with anxiety disorder diagnosis, by time since return from deployment, by predeployment anxiety disorder diagnosis, active component, U.S. Armed Forces, January 2006-December 2007



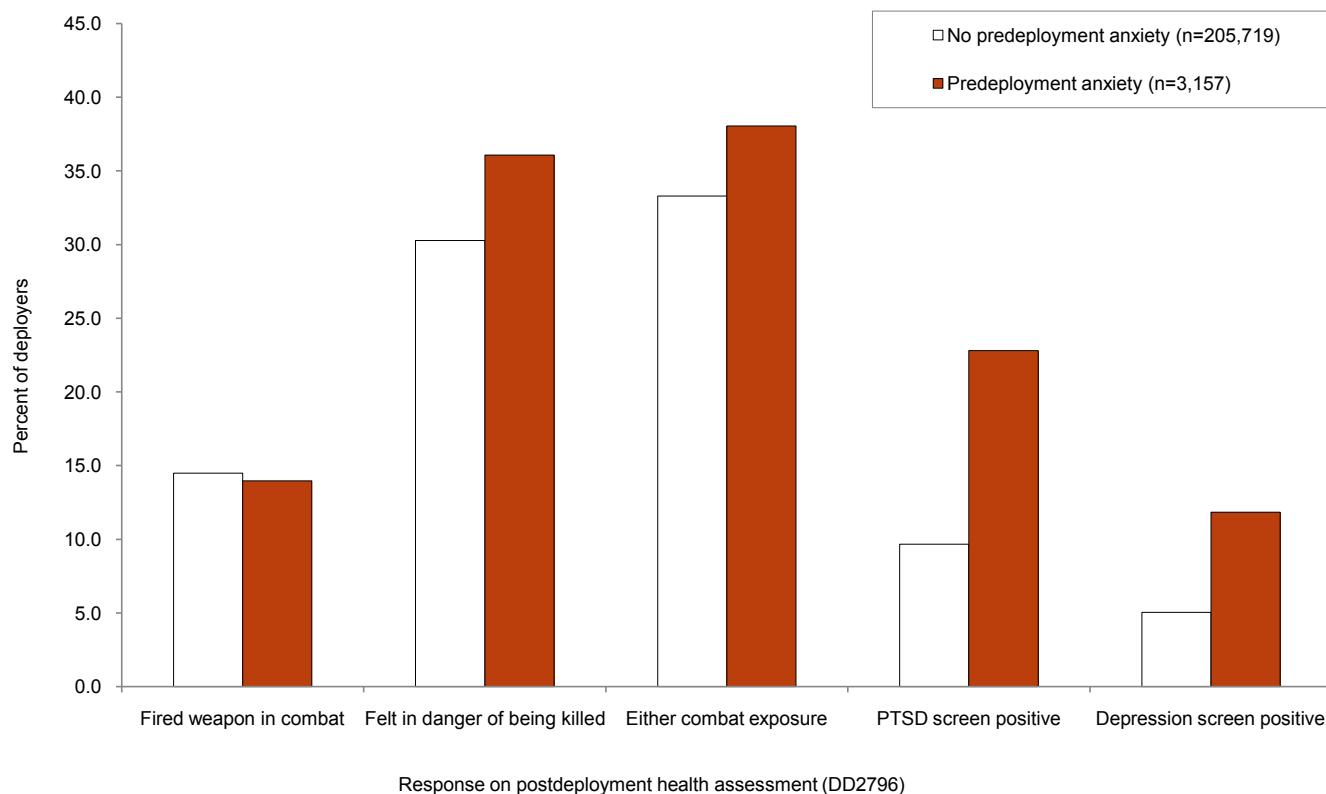
**Figure 2c.** Percentage of deployers with depression and anxiety disorder diagnoses, by time since return from deployment, by predeployment mental health treatment experience, active component, U.S. Armed Forces, January 2006-December 2007



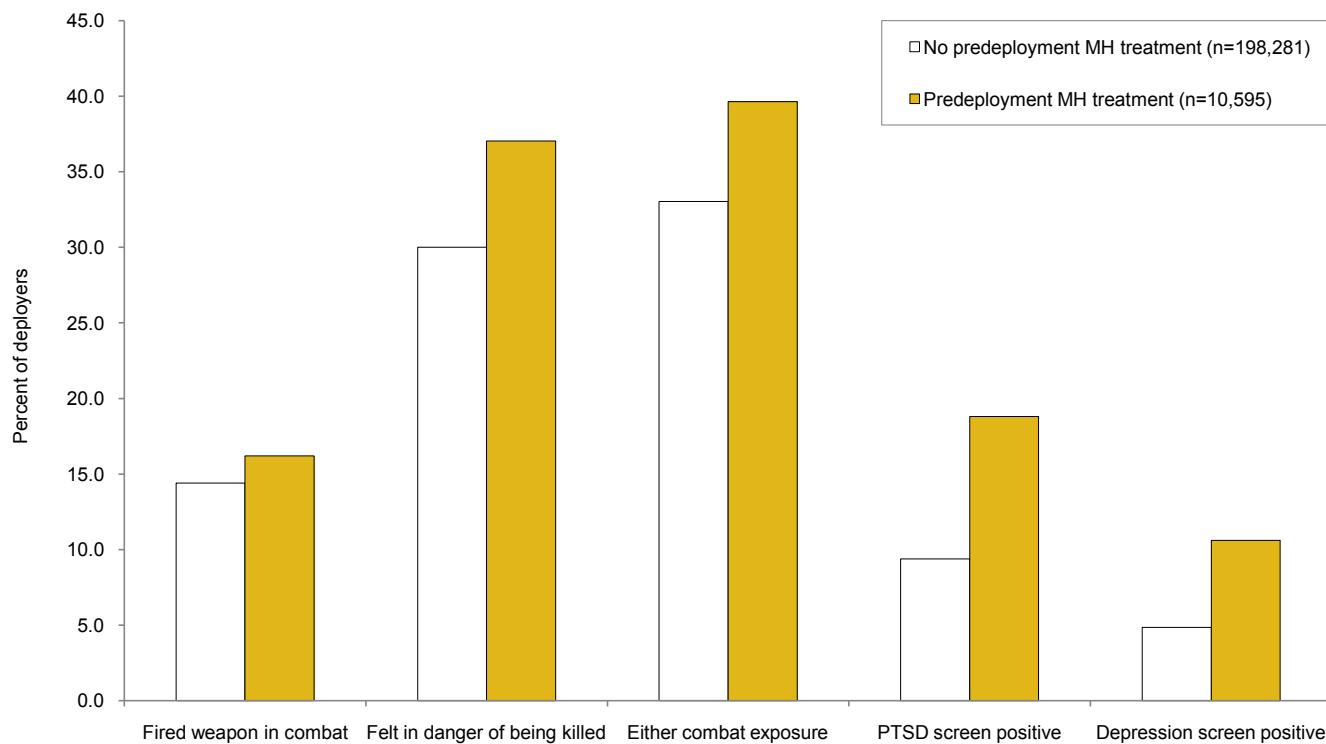
**Figure 3a.** Percentage of deployers with various self-reported combat exposures, positive PTSD screen, and positive depression screen, in relation to predeployment history of depression diagnosis, active component, U.S. Armed Forces, January 2006-December 2007



**Figure 3b.** Percentage of deployers with various self-reported combat exposures, positive PTSD screen, and positive depression screen, in relation to predeployment history of anxiety disorder diagnosis, active component, U.S. Armed Forces, January 2006-December 2007



**Figure 3c.** Percentage of deployers with various self-reported combat exposures, positive PTSD screen, and positive depression screen, in relation to predeployment history of mental health treatment, active component, U.S. Armed Forces, January 2006-December 2007 mental health treatment.



related reports, particularly in regard to the independent effects of -- and interactions between -- predeployment mental disorders and during-deployment combat exposures as predictors of postdeployment depression and anxiety disorder diagnoses.

In this analysis, associations between predeployment mental disorder diagnoses and postdeployment depression and anxiety disorder diagnoses were strongly apparent soon after return from deployment. Predeployment history became a less important predictor of postdeployment depression or anxiety disorder as time since returning from deployment elapsed.

In regard to combat exposure assessment, the analysis included an objective indicator (firing a weapon in combat) and a subjective indicator (feeling in danger of being killed). The latter is a manifestation of anxiety that is not indicative of a disorder (e.g., when lethal danger is imminent as in active combat). However, in this analysis, deployers with predeployment histories of anxiety were less likely to report firing a weapon but more likely to report feeling in danger of being killed. The finding suggests that service members perceive deployment-related events and activities differently; experiences considered life threatening by some may be less stressful to others. Such differences in perceptions of the same events during long assignments in combat zones may produce different levels and durations of stress; in some, the stress may be clinically expressed during and after the deployment. The finding supports current efforts (such as the U.S. Army's Battlemind training) to enhance the "inner strength" (i.e., facing fear and adversity with courage) and "mental toughness" (e.g., maintaining positive thoughts during times of adversity and challenge) of U.S. soldiers who participate in combat operations.

The results of this analysis also suggest that combat exposure was a relatively stronger predictor of postdeployment anxiety morbidity (evidenced by both clinical diagnosis and PTSD screening results) among deployers with no predeployment histories of mental disorder. Among deployers with clinically documented depression or anxiety morbidity prior to deployment, postdeployment depression and anxiety were relatively common regardless of self-reported combat exposure.

The diagnosis codes and categories used for this analysis represent disorders (i.e., depression and anxiety) that are plausibly related to deployment experiences. In addition, the categories of mental disorders used as endpoints of

analyses correspond to two screening instruments—the two item depression screen and the primary care PTSD screen (PC-PTSD)—incorporated in the postdeployment health assessment (DD2796).

The findings of this analysis add to those of many others; together, they provide insights which may enhance capabilities to prevent, detect, evaluate, and clinically manage the mental health effects of service in support of combat operations of the U.S. military.

Reported by Christopher B. Martin, MHS, Armed Forces Health Surveillance Center.

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## Update: Deployment Health Assessments, U.S. Armed Forces, August 2009

Since January 2003, peaks and troughs in the numbers of pre- and post-deployment health assessment forms transmitted to the Armed Forces Health Surveillance Center generally corresponded to times of departure and return of large numbers of deployers. Since April 2006, numbers of post-deployment health reassessments (PDHRA) transmitted per month have ranged from 17,000 to 36,000 (Table 1, Figure 1).

During the past 12 months, the proportions of returned deployers who rated their health as "fair" or "poor" were 8-11% on post-deployment health assessment questionnaires and 11-14% on PDHRA questionnaires (Figure 2).

In general, on post-deployment assessments and reassessments, deployers in the Army and in reserve components were more likely than their respective counterparts to report health and exposure-related concerns (Table 2, Figure 2). Both active and reserve component members were more likely to report exposure concerns three to six months after compared to the time of return from deployment (Figure 3).

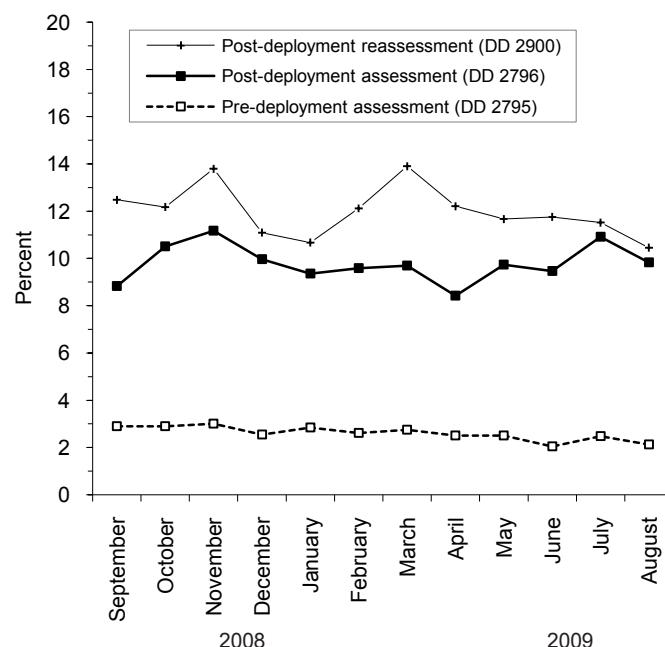
At the time of return from deployment, soldiers serving in the active component were the most likely of all deployers to receive mental health referrals; however, three to six months after returning, active component soldiers were less likely than Army and Marine Corps Reservists to receive mental health referrals (Table 2).

Finally, during the past three years, reserve component members have been more likely than active to report "exposure concerns" on post-deployment assessments and reassessments (Figure 3).

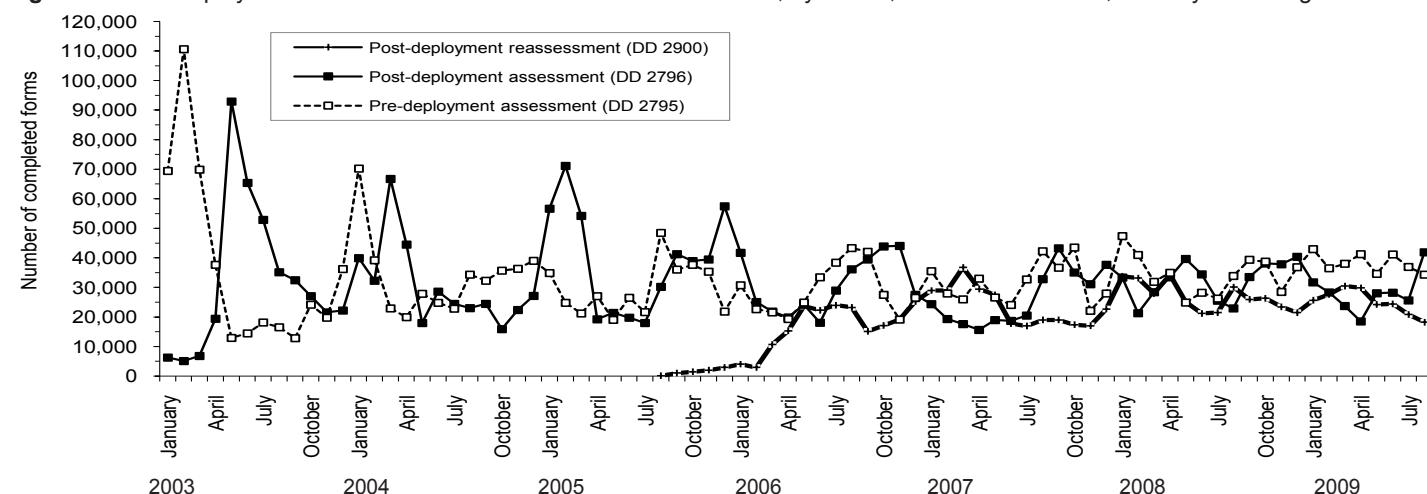
**Table 1.** Deployment-related health assessment forms, by month, U.S. Armed Forces, September 2008-August 2009

	Pre-deployment assessment DD2795		Post-deployment assessment DD2796		Post-deployment reassessment DD2900	
	No.	%	No.	%	No.	%
<b>Total</b>	<b>448,675</b>	<b>100</b>	<b>375,754</b>	<b>100</b>	<b>298,397</b>	<b>100</b>
<b>2008</b>						
September	39,294	8.8	33,530	8.9	25,914	8.7
October	38,678	8.6	38,070	10.1	26,340	8.8
November	28,441	6.3	37,825	10.1	23,423	7.8
December	36,792	8.2	40,375	10.7	21,480	7.2
<b>2009</b>						
January	42,965	9.6	31,747	8.4	25,635	8.6
February	36,420	8.1	28,322	7.5	27,624	9.3
March	37,954	8.5	23,701	6.3	30,471	10.2
April	41,227	9.2	18,480	4.9	29,868	10.0
May	34,528	7.7	28,045	7.5	24,201	8.1
June	41,095	9.2	28,205	7.5	24,406	8.2
July	36,943	8.2	25,611	6.8	20,833	7.0
August	34,338	7.7	41,843	11.1	18,202	6.1

**Figure 2.** Proportion of deployment health assessment forms with self-assessed health status as "fair" or "poor", U.S. Armed Forces, September 2008-August 2009



**Figure 1.** Total deployment health assessment and reassessment forms, by month, U.S. Armed Forces, January 2003-August 2009



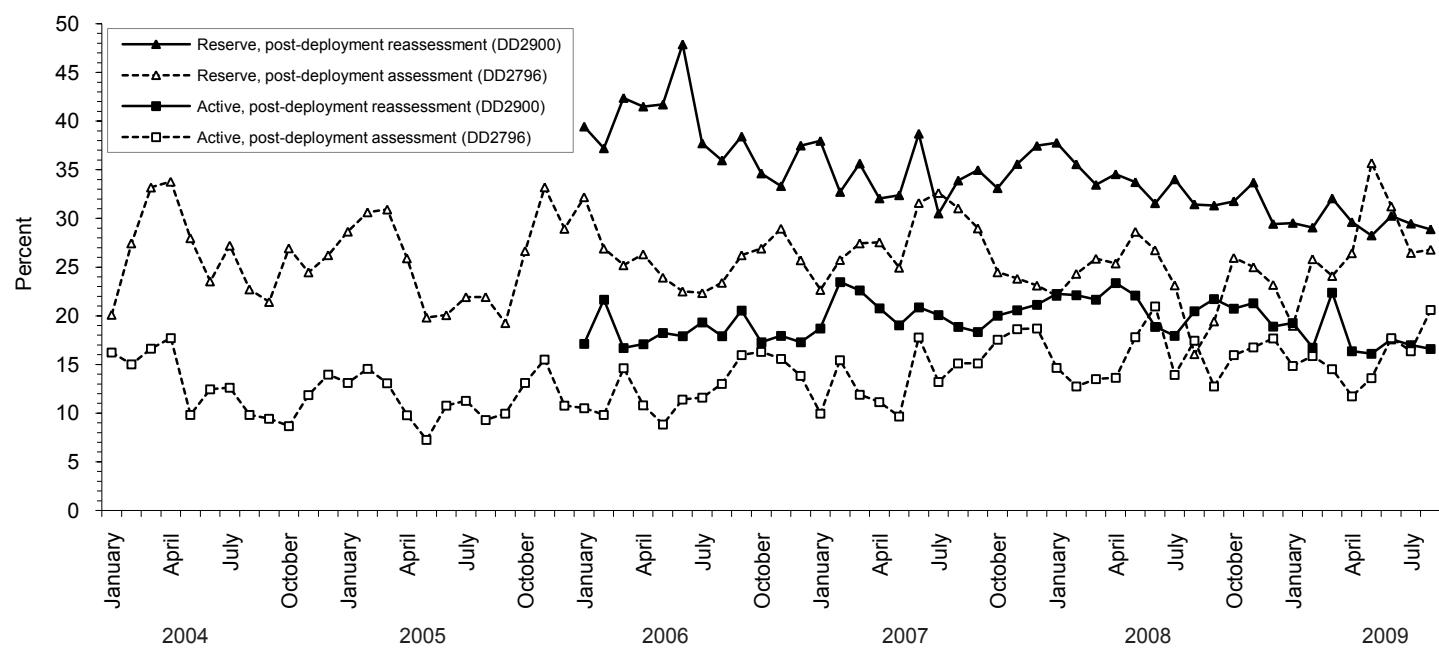
**Table 2.** Percentage of service members who endorsed selected questions/received referrals on health assessment forms, U.S. Armed Forces, September 2008-August 2009

	Army			Navy			Air Force			Marine Corps			All service members		
	Pre-deploy DD2795	Post-deploy DD2796	Reassess DD2900												
	n= 160,311	n= 136,088	n= 116,877	n= 11,586	n= 11,822	n= 13,557	n= 58,150	n= 52,139	n= 51,811	n= 22,028	n= 23,346	n= 28,044	n= 252,075	n= 223,395	n= 210,289
Active component	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	4.0	11.1	14.7	1.3	4.3	5.9	0.5	3.7	4.3	1.7	6.5	9.0	2.8	8.5	10.8
Health concerns, not wound or injury	18.3	25.1	24.7	4.0	14.3	13.5	1.4	5.9	10.8	3.1	13.7	17.2	12.4	18.8	19.5
Health worse now than before deployed	na	24.5	26.1	na	11.9	13.5	na	8.9	9.0	na	14.3	18.0	na	19.1	20.0
Exposure concerns	na	16.6	20.4	na	19.1	16.1	na	10.8	14.9	na	14.9	19.9	na	15.2	18.7
PTSD symptoms (2 or more)	na	9.9	13.4	na	4.5	6.8	na	2.3	2.6	na	4.8	8.5	na	7.3	9.7
Depression symptoms (any)	na	33.6	33.8	na	21.5	23.8	na	13.7	14.2	na	26.7	29.3	na	27.6	27.7
Referral indicated by provider (any)	4.8	33.2	20.4	5.5	23.8	15.3	1.6	10.6	6.7	3.6	21.9	23.0	4.0	26.3	17.0
Mental health referral indicated*	0.9	7.1	6.4	0.5	3.9	5.8	0.5	1.2	1.9	0.3	2.5	4.8	0.7	5.0	5.0
Medical visit following referral†	92.5	99.2	95.0	89.7	86.1	91.0	79.3	96.3	97.9	64.7	72.7	86.1	89.3	94.3	93.6
Reserve component	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	1.8	12.0	18.5	0.5	8.7	7.7	0.3	5.2	4.7	1.3	9.2	9.5	1.6	10.7	14.2
Health concerns, not wound or injury	14.0	33.8	46.3	2.4	30.9	28.9	0.6	9.2	14.3	3.3	20.4	33.1	11.5	29.2	37.4
Health worse now than before deployed	na	26.6	35.3	na	21.1	21.4	na	13.7	10.9	na	21.6	25.0	na	24.1	28.4
Exposure concerns	na	26.0	34.0	na	34.6	27.7	na	20.6	21.5	na	22.5	27.6	na	25.3	30.5
PTSD symptoms (2 or more)	na	9.3	22.6	na	5.9	10.1	na	2.1	2.9	na	5.6	13.6	na	7.9	16.9
Depression symptoms (any)	na	32.7	38.1	na	26.3	23.8	na	13.9	14.2	na	32.4	28.6	na	29.2	31.3
Referral indicated by provider (any)	3.8	38.0	33.6	4.2	30.7	17.5	0.7	13.6	5.5	3.0	26.5	27.1	3.3	33.3	26.0
Mental health referral indicated*	0.4	5.0	12.7	0.4	3.3	4.6	0.0	0.7	0.9	0.4	2.7	8.3	0.4	4.1	9.3
Medical visit following referral†	95.0	97.6	34.3	90.8	92.4	37.5	34.3	65.8	41.7	32.5	69.6	25.5	90.8	94.3	34.3

\*Includes behavioral health, combat stress and substance abuse referrals.

†Record of inpatient or outpatient visit within 6 months after referral.

**Figure 3.** Proportion of service members who endorsed exposure concerns on post-deployment health assessments, U.S. Armed Forces, January 2004-August 2009



**Sentinel reportable events for service members and beneficiaries at U.S. Army medical facilities, cumulative numbers<sup>a</sup> for calendar years through 31 August 2008 and 31 August 2009**



Reporting locations	Number of reports all events <sup>b</sup>		Food-borne						Vaccine preventable					
			Campylo-bacter		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella <sup>c</sup>	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
<b>NORTH ATLANTIC</b>														
Washington, DC Area	166	161	1	1	1	-	1	-	1	-	2	3	6	1
Aberdeen, MD	4	34	-	-	-	-	-	-	-	1	-	-	-	-
FT Belvoir, VA	138	181	5	8	10	3	3	-	-	-	-	-	-	-
FT Bragg, NC	949	1,267	-	6	10	16	-	-	-	-	-	2	-	-
FT Drum, NY	163	28	-	-	-	-	-	-	-	-	-	-	-	-
FT Eustis, VA	184	176	1	-	1	2	-	-	-	-	-	-	1	-
FT Knox, KY	170	149	2	-	-	-	-	-	-	-	-	-	-	-
FT Lee, VA	223	331	-	-	-	-	-	-	-	-	4	-	1	-
FT Meade, MD	38	34	-	-	-	-	1	-	-	-	-	-	-	-
West Point, NY	53	71	-	1	-	-	-	-	-	-	1	1	-	-
<b>GREAT PLAINS</b>														
FT Sam Houston, TX	313	421	-	1	8	5	12	1	-	-	-	1	-	1
FT Bliss, TX	333	256	-	-	8	1	-	1	-	1	-	5	-	-
FT Carson, CO	457	522	2	5	2	3	-	-	1	1	-	-	-	-
FT Hood, TX	1,413	1,422	5	7	21	14	5	10	-	-	-	2	2	-
FT Huachuca, AZ	66	60	-	-	1	-	2	-	-	-	1	-	-	-
FT Leavenworth, KS	33	48	-	-	-	1	-	-	-	-	-	-	-	-
FT Leonard Wood, MO	168	273	2	1	1	-	1	-	1	1	1	-	1	1
FT Polk, LA	137	449	1	-	-	1	1	3	-	-	-	-	1	-
FT Riley, KS	284	284	-	1	1	3	-	-	-	-	2	-	-	-
FT Sill, OK	83	150	-	-	-	-	-	3	-	-	-	-	-	-
<b>SOUTHEAST</b>														
FT Gordon, GA	457	491	1	1	10	7	13	3	-	-	1	2	2	1
FT Benning, GA	253	242	2	1	5	-	1	1	-	1	-	-	-	-
FT Campbell, KY	131	333	1	-	-	-	2	-	-	-	-	-	-	-
FT Jackson, SC	225	445	-	-	-	-	-	-	-	-	1	2	-	-
FT Rucker, AL	58	54	1	7	4	1	-	-	-	-	-	-	-	-
FT Stewart, GA	541	804	3	-	12	22	1	13	1	-	8	-	-	-
<b>WESTERN</b>														
FT Lewis, WA	754	783	6	3	2	4	2	1	-	-	-	-	-	-
FT Irwin, CA	28	88	-	-	-	1	1	1	-	-	-	-	-	-
FT Wainwright, AK	237	144	4	-	1	-	-	-	-	-	-	-	-	-
<b>PACIFIC</b>														
Hawaii	559	570	28	27	12	12	3	4	1	-	4	2	-	-
Japan	0	0	-	-	-	-	-	-	-	-	-	-	-	-
Korea	511	582	-	-	1	-	-	-	-	-	-	1	-	-
<b>OTHER LOCATIONS</b>														
Germany	737	1,082	8	13	17	11	5	1	1	1	3	1	1	1
Unknown	0	0	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>9,866</b>	<b>11,935</b>	<b>73</b>	<b>83</b>	<b>128</b>	<b>107</b>	<b>54</b>	<b>42</b>	<b>6</b>	<b>6</b>	<b>29</b>	<b>21</b>	<b>16</b>	<b>5</b>

<sup>a</sup>Events reported by Sep 7, 2008 and 2009

<sup>b</sup>Sixty-seven medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, June 2009.

<sup>c</sup>Service member cases only.

Note: Completeness and timeliness of reporting vary by facility.

**Sentinel reportable events for service members and beneficiaries at U.S. Army medical facilities, cumulative numbers<sup>a</sup> for calendar years through 31 August 2008 and 31 August 2009**



Army

Reporting location	Arthropod-borne				Sexually transmitted				Environmental				Travel associated					
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis		Cold <sup>c</sup>		Heat <sup>c</sup>		Q Fever		Tuberculosis	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
<b>NORTH ATLANTIC</b>																		
Washington, DC Area	12	17	1	.	100	111	18	15	6	12	.	.	14	.	3	.	.	1
Aberdeen, MD	.	.	.	.	3	27	1	4	.	2	.	.	.	.	.	.	.	.
FT Belvoir, VA	.	.	.	.	112	154	8	16	.	.	.	.	.	.	.	.	.	.
FT Bragg, NC	1	.	9	.	717	969	156	185	1	3	.	1	54	85	.	.	1	.
FT Drum, NY	3	.	.	.	146	25	14	3	.	.	.	.	.	.	.	.	.	.
FT Eustis, VA	.	.	.	.	153	149	24	25	3	.	.	.	.	1	.	.	.	.
FT Knox, KY	1	1	.	.	133	129	31	19	1	.	.	.	2	.	.	.	.	.
FT Lee, VA	2	1	1	.	153	297	57	31	.	2	.	.	5	.	.	.	.	.
FT Meade, MD	1	1	.	.	34	33	2	.	.	.	.	.	.	.	.	.	.	.
West Point, NY	30	16	.	.	22	51	.	2	.	.	.	.	.	.	.	.	.	.
<b>GREAT PLAINS</b>																		
FT Sam Houston, TX	.	.	.	.	215	320	57	66	17	10	1	.	3	16	.	.	.	.
FT Bliss, TX	.	.	.	.	266	209	53	33	5	5	.	.	.	.	.	.	1	1
FT Carson, CO	.	.	.	.	410	468	41	45	.	.	.	.	.	.	.	.	.	.
FT Hood, TX	.	.	.	.	1,140	1,109	239	257	.	8	.	.	.	14	1	.	.	1
FT Huachuca, AZ	1	.	.	.	50	55	9	3	.	1	.	.	2	1	.	.	.	.
FT Leavenworth, KS	1	3	.	.	28	39	4	3	.	1	.	.	.	1	.	.	.	.
FT Leonard Wood, MO	.	.	.	.	134	238	14	25	1	.	3	1	7	5	.	.	2	1
FT Polk, LA	.	.	.	.	89	277	26	41	1	1	.	.	18	126	.	.	.	.
FT Riley, KS	4	.	1	1	243	236	23	38	1	1	1	1	8	3	.	.	.	.
FT Sill, OK	.	.	.	.	62	113	12	15	.	.	.	.	9	19	.	.	.	.
<b>SOUTHEAST</b>																		
FT Gordon, GA	.	.	.	.	348	401	81	68	.	.	.	.	1	8	.	.	.	.
FT Benning, GA	.	.	.	5	171	187	54	44	1	1	.	.	19	1	.	.	.	1
FT Campbell, KY	.	5	.	.	118	221	5	60	1	1	.	.	4	46	.	.	.	.
FT Jackson, SC	.	.	.	.	180	223	24	36	1	2	.	.	19	182	.	.	.	.
FT Rucker, AL	2	.	.	.	40	42	7	4	2	.	.	.	2	.	.	.	.	.
FT Stewart, GA	.	.	2	.	421	582	72	97	2	5	.	.	18	78	1	6	.	1
<b>WESTERN</b>																		
FT Lewis, WA	.	.	5	.	672	707	66	66	1	1	.	.	.	1	.	.	.	.
FT Irwin, CA	.	.	.	.	13	78	3	2	.	2	.	.	11	4	.	.	.	.
FT Wainwright, AK	1	.	.	.	194	130	24	10	1	.	10	1	1	1	.	1	1	1
<b>PACIFIC</b>																		
Hawaii	.	.	1	.	445	466	56	48	.	3	.	.	2	2	.	1	7	5
Japan	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Korea	.	.	.	.	449	549	53	25	4	2	.	1	3	5	.	.	.	.
<b>OTHER LOCATIONS</b>																		
Germany	25	33	10	5	492	885	114	100	7	9	8	1	18	18	25	1	3	2
Unknown	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<b>Total</b>	<b>84</b>	<b>77</b>	<b>30</b>	<b>11</b>	<b>7,753</b>	<b>9,480</b>	<b>1,348</b>	<b>1,386</b>	<b>56</b>	<b>72</b>	<b>23</b>	<b>6</b>	<b>221</b>	<b>616</b>	<b>30</b>	<b>9</b>	<b>15</b>	<b>14</b>

**Sentinel reportable events for service members and beneficiaries at U.S. Air Force medical facilities, cumulative numbers<sup>a</sup> for calendar years through 31 August 2008 and 31 August 2009**



Air Force

Reporting locations	Number of reports all events <sup>b</sup>		Food-borne						Vaccine preventable					
			Campylobacter		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella <sup>c</sup>	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
Air Combat Cmd	1,024	978	3	4	14	13	4	2	4	.	29	3	1	2
Air Education & Training Cmd	494	1,074	1	3	10	16	3	2	3	3	3	5	.	.
Air Force Dist. of Washington	141	130	.	.	2	1	.	.	1	.	2	2	.	.
Air Force Materiel Cmd	404	364	2	.	6	5	7	.	2	.	.	4	.	.
Air Force Special Ops Cmd	145	115	.	1	3	4	.	.	.	.	3	.	.	.
Air Force Space Cmd	199	178	1	2	6	6	1	.	.	1	2	1	.	.
Air Mobility Cmd	563	543	1	4	7	6	2	2	.	1	5	3	.	1
Pacific Air Forces	542	350	7	2	5	4	.	.	3	.	8	4	.	1
U.S. Air Forces in Europe	374	417	1	3	2	4	.	.	.	.	4	4	1	.
U.S. Air Force Academy	25	38	1	1	.	2	.	.	.	.	.	.	.	.
Other	504	71	4	1	9	3	7	.	1	.	1	.	.	.
<b>Total</b>	<b>4,415</b>	<b>4,258</b>	<b>21</b>	<b>21</b>	<b>64</b>	<b>64</b>	<b>24</b>	<b>6</b>	<b>14</b>	<b>5</b>	<b>57</b>	<b>26</b>	<b>2</b>	<b>4</b>

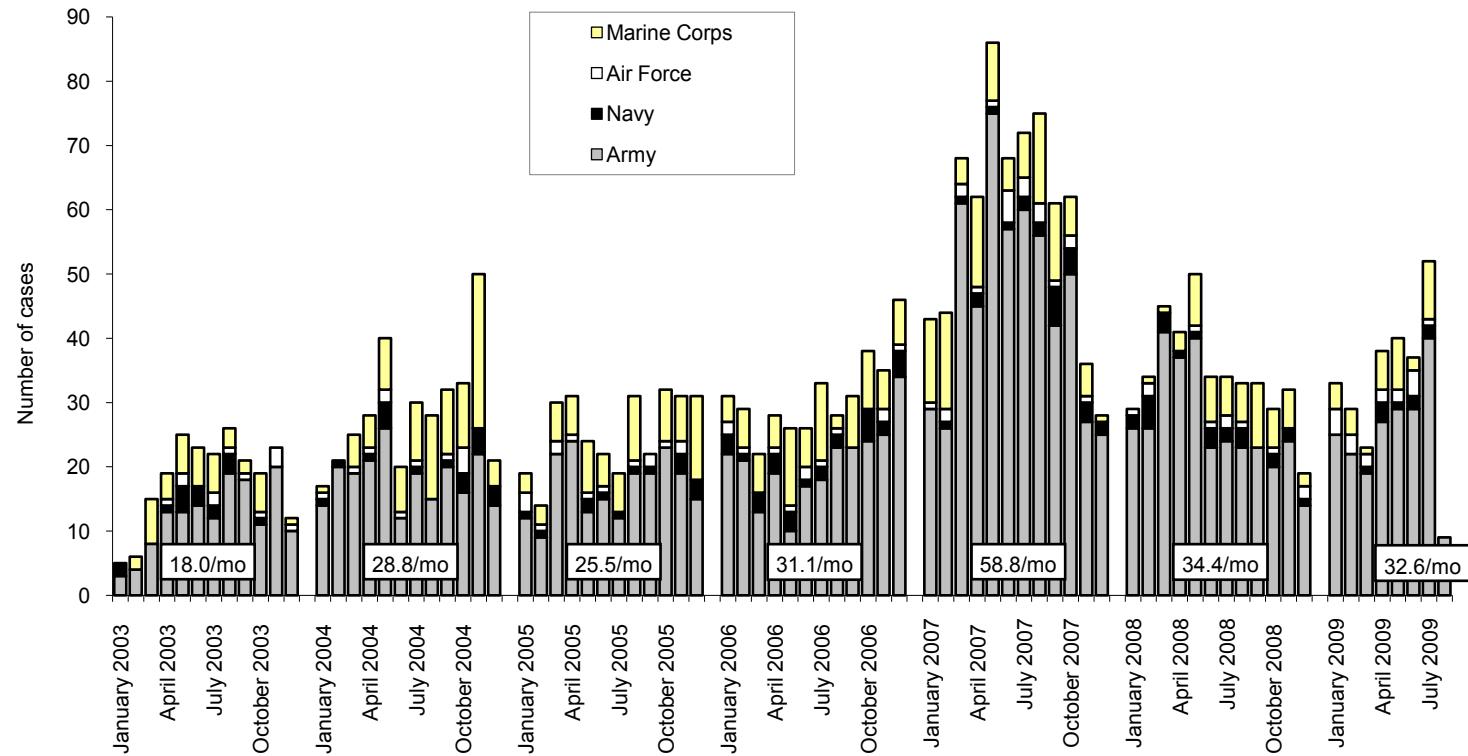
<sup>a</sup>Events reported by Sep 7, 2009<sup>b</sup>Sixty-seven medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, June 2009.<sup>c</sup>Service member cases only.

Note: Completeness and timeliness of reporting vary by facility.

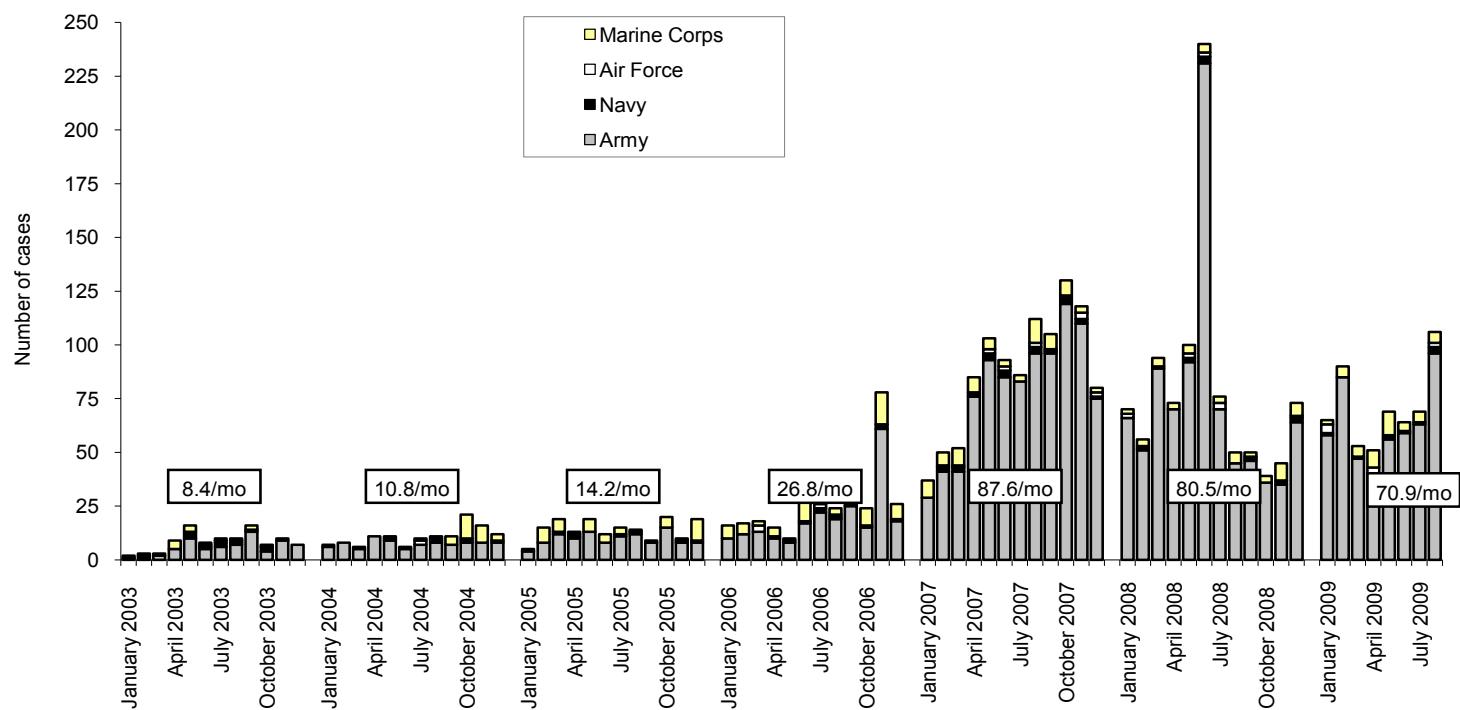
Reporting location	Arthropod-borne				Sexually transmitted				Environmental				Travel associated					
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis		Cold <sup>c</sup>		Heat <sup>c</sup>		Q Fever		Tuberculosis	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
Air Combat Cmd	4	7	.	.	866	863	92	71	3	3	3	5	1	5	.	.	.	.
Air Education & Training Cmd	4	6	.	2	417	929	43	96	5	4	1	.	4	8	.	.	.	.
Air Force Dist. of Washington	3	5	.	.	117	114	15	8	1	.	.	.	.	.	.	.	.	.
Air Force Materiel Cmd	9	9	1	.	322	314	50	30	3	2	.	.	.	.	1	.	1	.
Air Force Special Ops Cmd	.	1	1	.	128	104	9	3	.	1	.	1	.	.	1	.	.	.
Air Force Space Cmd	1	.	.	.	177	159	11	7	.	.	.	.	.	1	.	.	.	1
Air Mobility Cmd	13	16	.	1	473	455	49	46	3	1	4	6	4	1	1	.	1	.
Pacific Air Forces	.	.	.	1	490	290	25	32	1	2	2	8	.	6	.	.	1	.
U.S. Air Forces in Europe	13	14	3	1	322	356	28	30	.	2	.	1	.	.	.	.	.	2
U.S. Air Force Academy	1	1	.	1	22	32	.	1	.	.	1	.	.	.	.	.	.	.
Other	6	.	.	5	441	36	26	6	1	.	.	1	5	17	3	1	.	1
<b>Total</b>	<b>54</b>	<b>59</b>	<b>5</b>	<b>11</b>	<b>3,775</b>	<b>3,652</b>	<b>348</b>	<b>330</b>	<b>17</b>	<b>15</b>	<b>11</b>	<b>22</b>	<b>14</b>	<b>38</b>	<b>6</b>	<b>1</b>	<b>3</b>	<b>4</b>

## Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - August 2009 (data as of 23 September 2009)

Traumatic brain injury, hospitalizations (ICD-9: 310.2, 800-801, 803-804, 850-854, 950.1-950.3, 959.01, V15.5\_1-9, V15.5\_A-F)<sup>a</sup>



Traumatic brain injury, multiple ambulatory visits (without hospitalization), (ICD-9: 310.2, 800-801, 803-804, 850-854, 950.1-950.3, 959.01, V15.5\_1-9, V15.5\_A-F)<sup>b</sup>



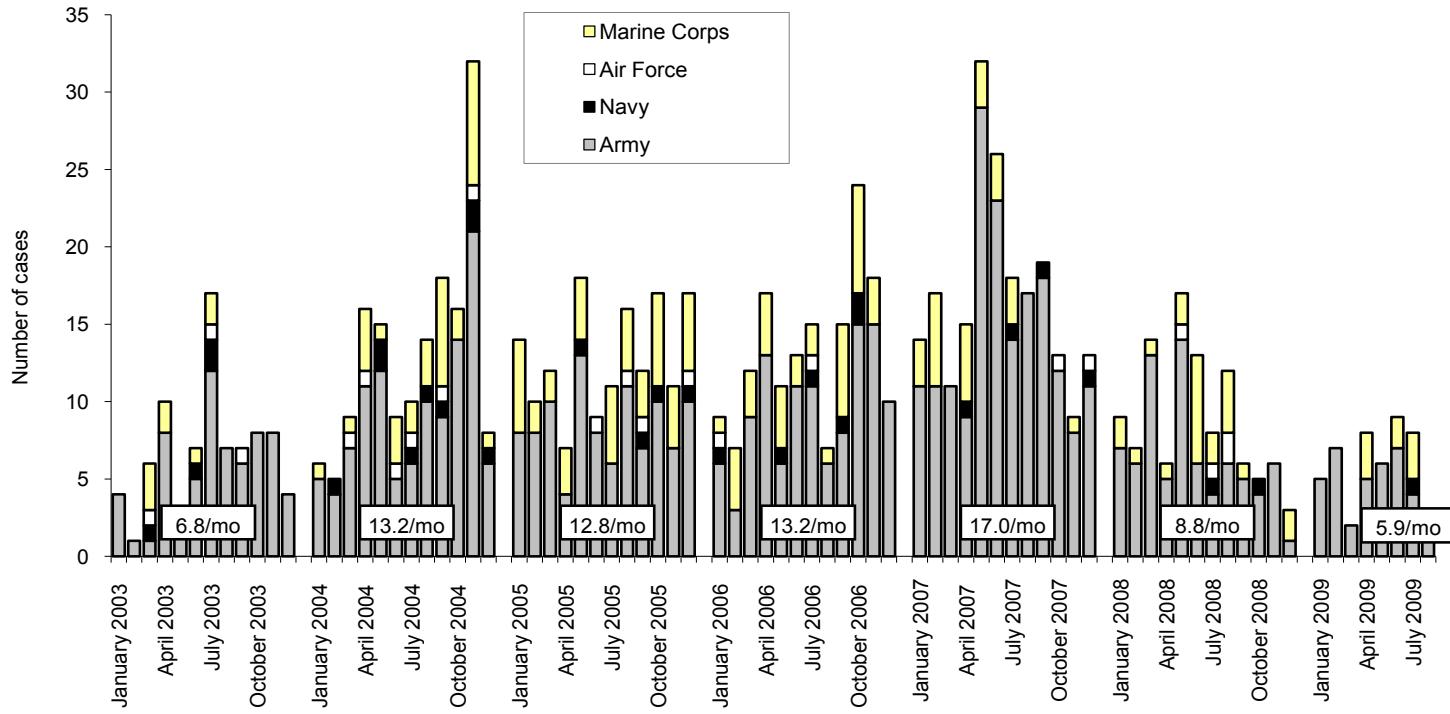
Reference: Armed Forces Health Surveillance Center. Frequencies, rates and trends of use of diagnostic codes indicative of traumatic brain injury (TBI), July 1999-June 2008. MSMR. Dec 2008; 15(10):2-9.

<sup>a</sup>Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 30 days of returning from OEF/OIF.

<sup>b</sup>Two or more ambulatory visits at least 7 days apart (one case per individual) while deployed to/within 30 days of returning from OEF/OIF.

## Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - August 2009 (data as of 23 September 2009)

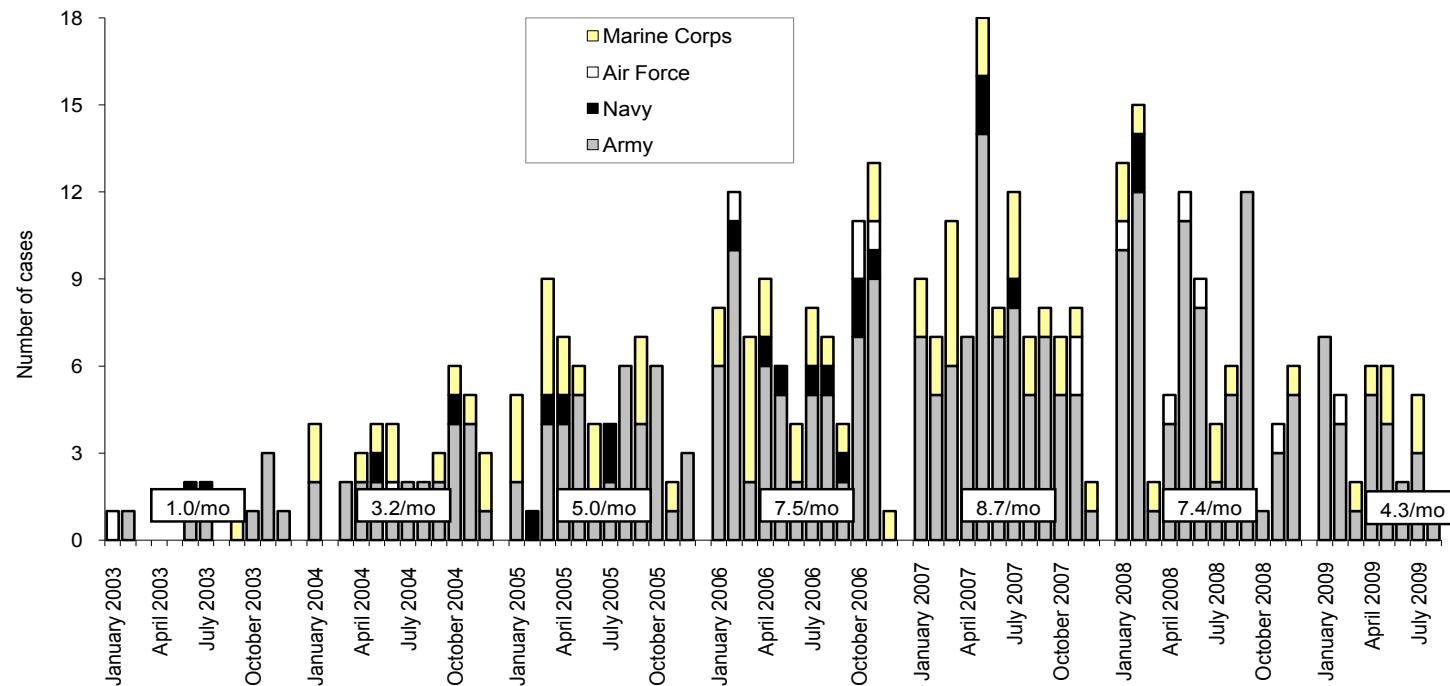
Amputations (ICD-9: 887, 896, 897, V49.6 except V49.61-V49.62, V49.7 except V49.71-V49.72, PR 84.0-PR 84.1, except PR 84.01-PR 84.02 and PR 84.11)<sup>a</sup>



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: amputations. Amputations of lower and upper extremities, U.S. Armed Forces, 1990-2004. MSMR. Jan 2005;11(1):2-6.

<sup>a</sup>Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 365 days of returning from OEF/OIF.

Heterotopic ossification (ICD-9: 728.12, 728.13, 728.19)<sup>b</sup>

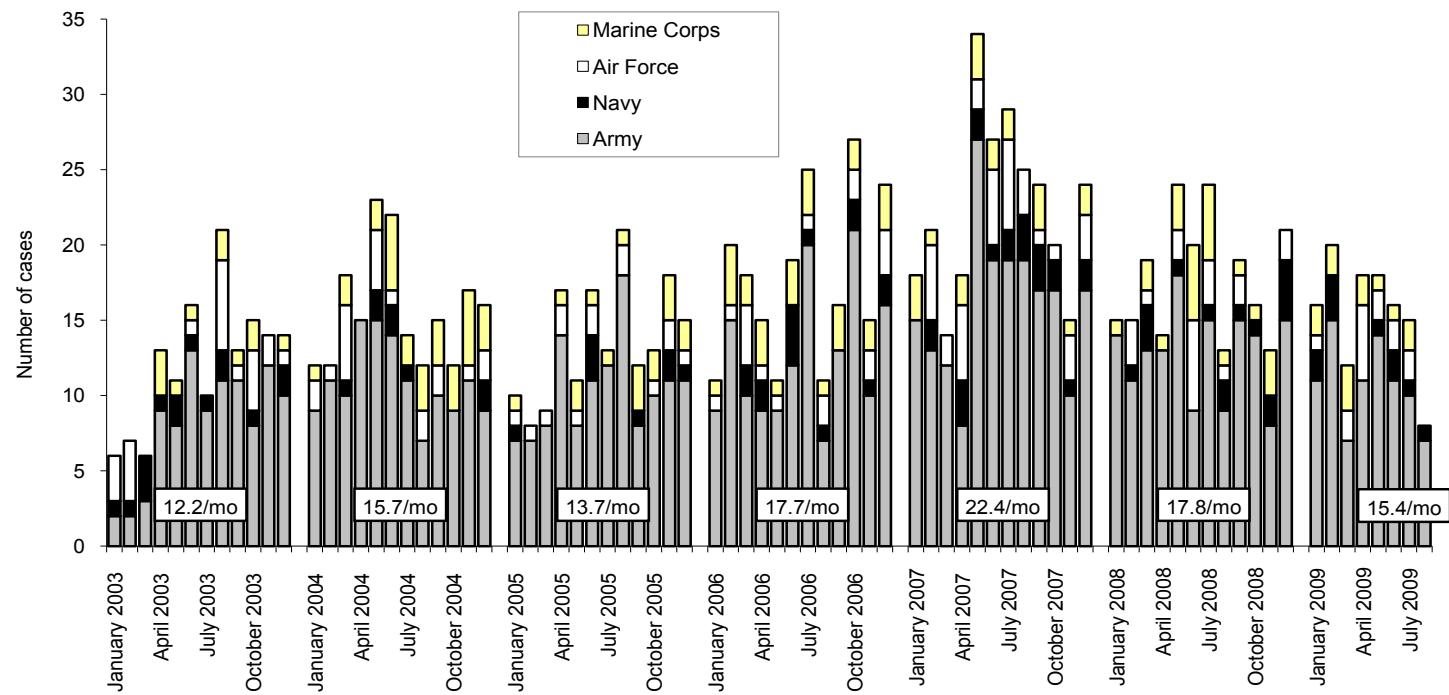


Reference: Army Medical Surveillance Activity. Heterotopic ossification, active components, U.S. Armed Forces, 2002-2007. MSMR. Aug 2007; 14(5):7-9.

<sup>b</sup>One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart (one case per individual) while deployed to/within 365 days of returning from OEF/OIF.

## Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - August 2009 (data as of 23 September 2009)

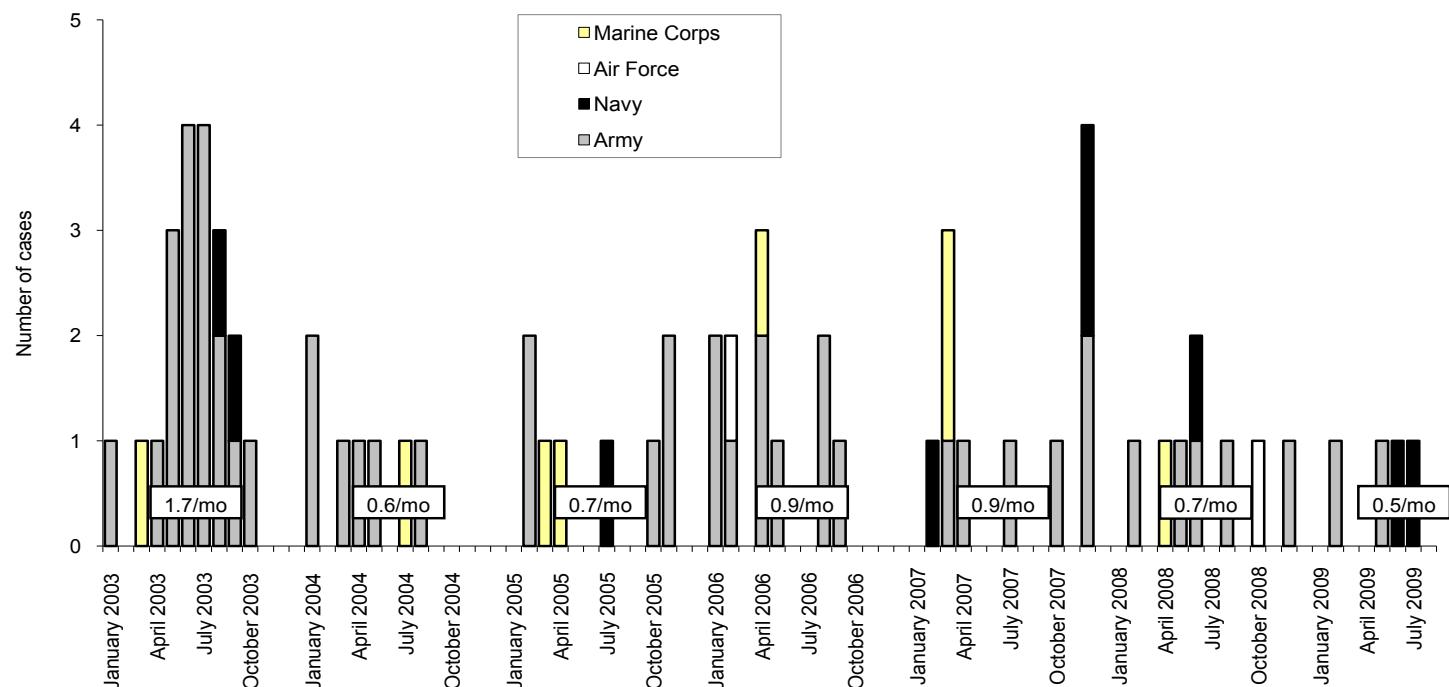
Deep vein thrombophlebitis/pulmonary embolus (ICD-9: 415.1, 451.1, 451.81, 451.83, 451.89, 453.2, 453.40 - 453.42 and 453.8)<sup>a</sup>



Reference: Isenbarger DW, Atwood JE, Scott PT, et al. Venous thromboembolism among United States soldiers deployed to Southwest Asia. *Thromb Res*. 2006;117(4):379-83.

<sup>a</sup>One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart (one case per individual) while deployed to/within 90 days of returning from OEF/OIF.

Severe acute pneumonia (ICD-9: 518.81, 518.82, 480-487, 786.09)<sup>b</sup>



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: severe acute pneumonia. Hospitalizations for acute respiratory failure (ARF)/acute respiratory distress syndrome (ARDS) among participants in Operation Enduring Freedom/Operation Iraqi Freedom, active components, U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):6-7.

<sup>b</sup>Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 30 days of returning from OEF/OIF.

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